

MOTOR AGE

Vol. XXX
No. 2

CHICAGO, JULY 13, 1916

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TRADE MARK

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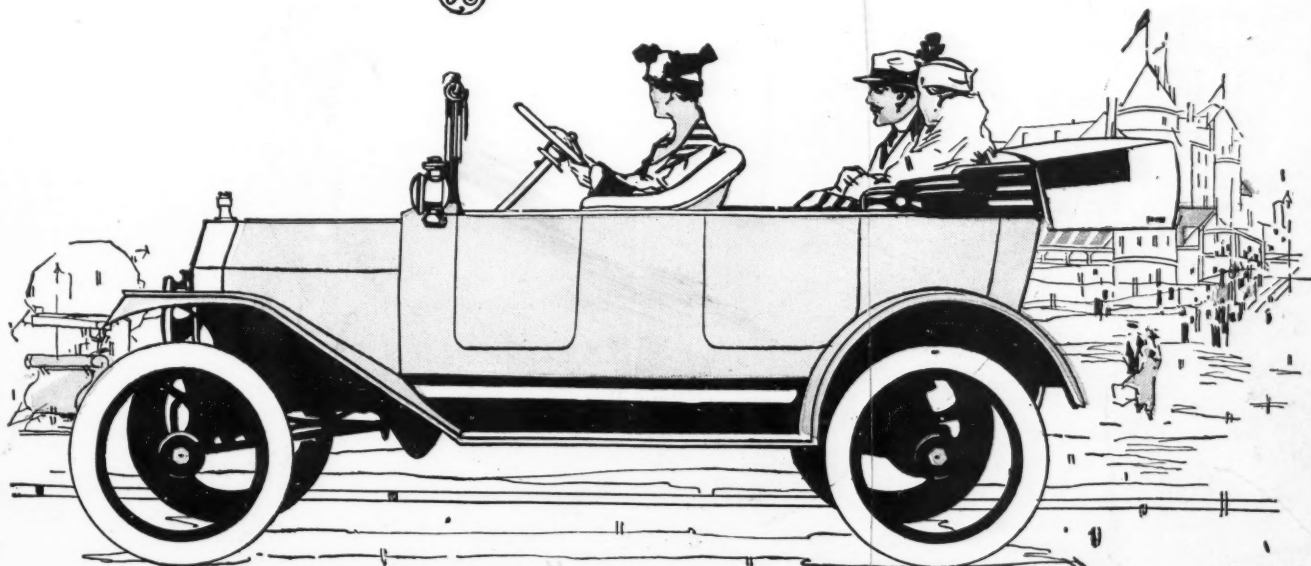
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Run through the pages of this book.
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advertisements.

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one that is growing bigger every day.

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No Ford accessory is needed, demanded, or
advertised like the Stewart Speedometer
for Fords.

"No car is better than its accessories"

The Stewart-Warner Speedometer Corporation
Chicago, Ill., U. S. A.

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MOTOR AGE



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SUBSCRIPTIONS received up to the 15th of the month begin with first issue of that month; those received later, start with first issue of following month.

RENEWALS or CHANGE OF ADDRESS should be sent two weeks in advance of date they are to go into effect. Be sure to send old as well as new address to avoid unnecessary delay. RECEIPT of first copy is acknowledgment of subscription.

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ANNOUNCEMENTS

In "What the Car Factory's Service Department Means to the Owner," which is the feature article of Motor Age for July 20, a former official of the service department of a big motor car manufacturer tells the system of operation of service to owners and how they can get the most out of it.

A Word When He Buys Is Sufficient

A million vacations for motorists are on the way.

During the next three months, thousands of cars will help make successful the greatest motoring season of history.

The call of the road that six months ago stimulated interest in your accessory or car advertising, is the vital issue of today.

Your prospect of January is your customer of July.

The business you started in early season advertising is ready now to close.

The July, August and September vacation issues of MOTOR AGE are the big last-calls of your advertising-salesmen.

They re-establish your products in the minds of more than 30,000 prospects in time to answer the vital question: "What shall we buy today, to be properly equipped for our tour that starts tomorrow?"

The time is ripe to make every prospect's "good will," a sale—and right now a word when he buys is sufficient.

MOTOR AGE
Mallers Bldg., Chicago



Opportunities

Another one in Illinois

—a city located about 178 miles from Chicago—a city nationally known for its production of plows, in fact, for all kinds of farm implements from harrows to tractors.

Population totals more than 25,000; leading industries—agricultural implements, carriages, wagons and motor cars. Rolling mills also form an important part of the industrial life, and extensive water power systems give promise of early and profitable business expansion. Such railroads like the Burlington, Rock Island and Illinois Central maintain large terminals in this city.

This is one of the few opportunities for energetic dealers that Studebaker has in the Middle West. Write for all the facts and details.



STUDEBAKER

South Bend, Ind.

Detroit, Mich.

Walkerville, Ont.

Address all correspondence to Detroit

When Writing to Advertisers, Please Mention Motor Age

MOTOR AGE

A Great Highway of the Northwest

By William K. Gibbs



Part of business district of Seattle, Puget Sound and the rugged snow-capped Olympic mountains

Linking Puget Sound With Plymouth Rock—Scenes from Chicago to the Pacific Coast

LET us assume that you have definitely decided to make a long cross-country tour; that you live in Chicago, Seattle, or some point between; that you have chosen to make your trip via the Yellowstone trail and that your knowledge of what is to be seen along this interesting route and the conditions of the highway in question is not just as clear to you as it should be. Now we have the stage all set and if the orchestra will play a little soft music, put in the twitter and chirp of a bird or two to denote that it is early morning and time we were off, I will outline for you some of the things to see, places to visit, and tell you of the road and its condition. What I leave unsaid will be shown in the illustrations that follow and that part of the

road lying west of Chicago will be shown in maps on each page. The Yellowstone trail has a slogan—"A Good Road from Plymouth Rock to Puget Sound"—but only the western part will be taken up at this time.

There is none of

the Yellowstone trail that is not entirely feasible for travel, and practically all of it is improved and hard road. Since last year the road has improved 100 per cent and nothing is being left undone to make this route the best long road in the country.

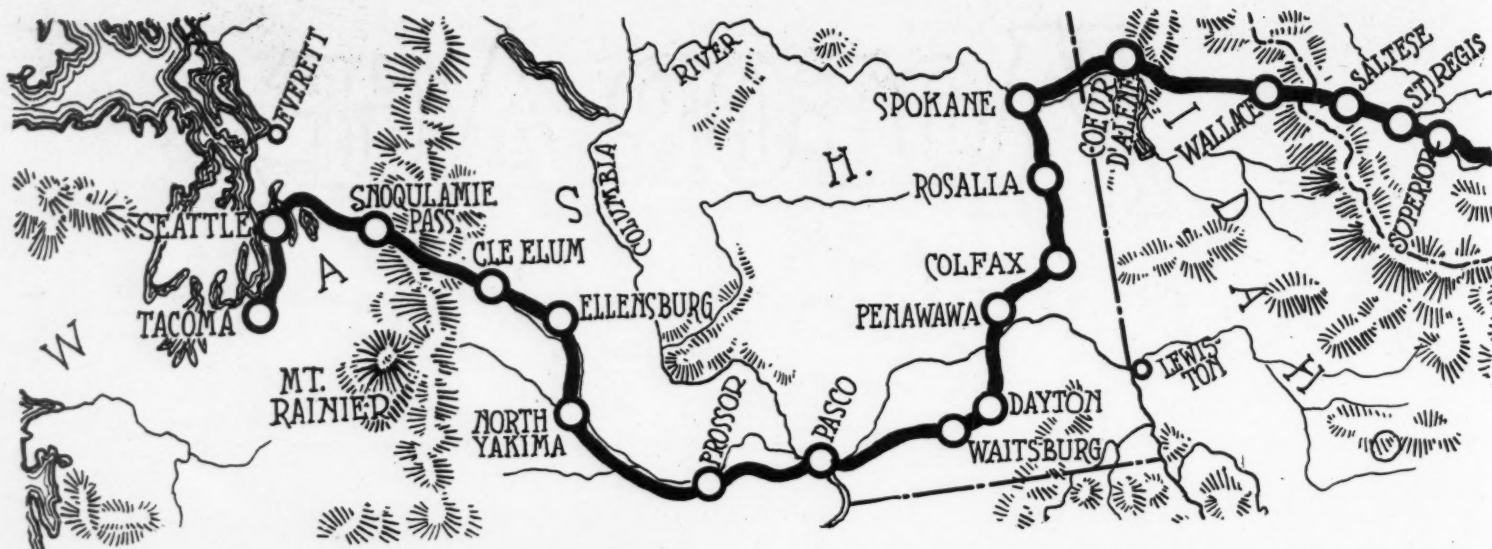
From Chicago the road follows the Fox river valley to Oshkosh, then through the beautiful lake and resort region of Wisconsin and on to Minneapolis. This part measures 496 miles, and many interesting side trips can be made if one desires. In Minnesota one again finds many lakes and beautiful scenery, for this trail passes through the very heart of the "Land of Sky-Blue Water," as Minnesota has come to be known. The section from Minneapolis to Aberdeen, S. D., where the headquarters of the highway are located, is 335 miles.

The first 100 miles west of Aberdeen is through mildly rolling country, a great agricultural and stock-raising region. Here and farther on, near Mobridge, the tourist gets a first-hand idea of the conversion of the frontier into settled country. Through the Standing Rock Indian Reservation is found the typical life of the Indians. An Indian school at Bull Head, the place where Sitting Bull was killed, is an interesting feature. This section



Plymouth Rock, where the Pilgrims landed

J. W. Parmley, Ipswich, president of the trail



Left—Yellowstone trail through the splendid forests and scenery of Washington

Above—View on Lake Keechelus between Ellensburg and summit of Snoqualmie pass

Below—Walla Walla scene, orchards of Washington

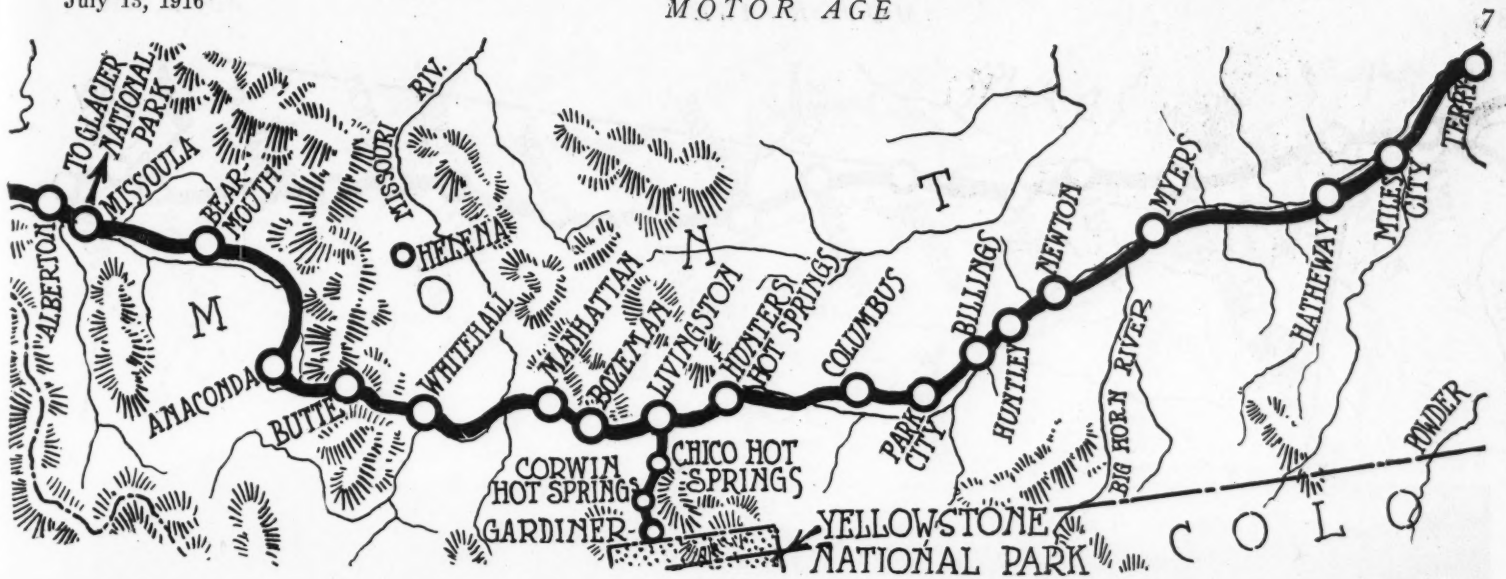


Right—Plenty of trout fishing in Washington streams on the Yellowstone trail

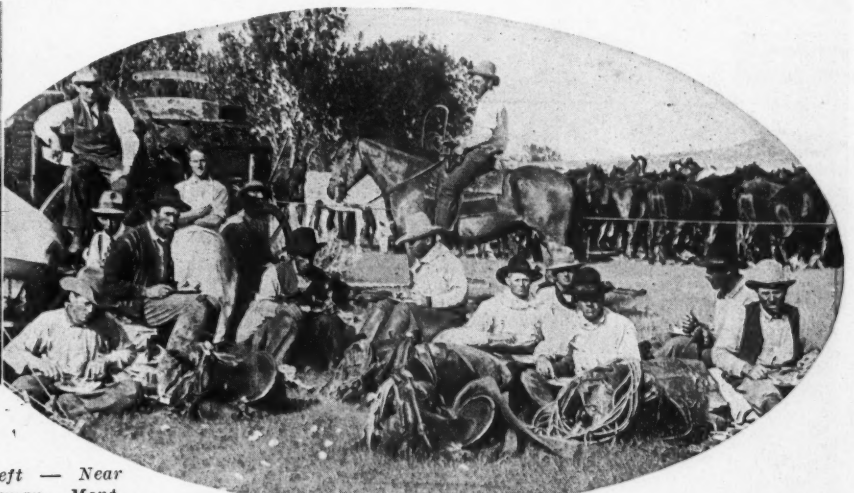


used to be famous for stage coach holdups, but no fear need be entertained at present.

At Hettinger one gets from the rocks on the buttes numerous beautiful imprints of leaves; also some fossils, while at Marmath one strikes the famous Bad Lands, a curious natural formation that is very interesting and unique. The distance from Aberdeen to Marmath is 333 miles. Push-



New Flint creek road, showing Georgetown Lake and mountains in the distance



Dinner on the round-up in Montana



Left — Near Bozeman, Mont. Road built by convicts, 30 miles of gravel road with 6 per cent grade over mountain

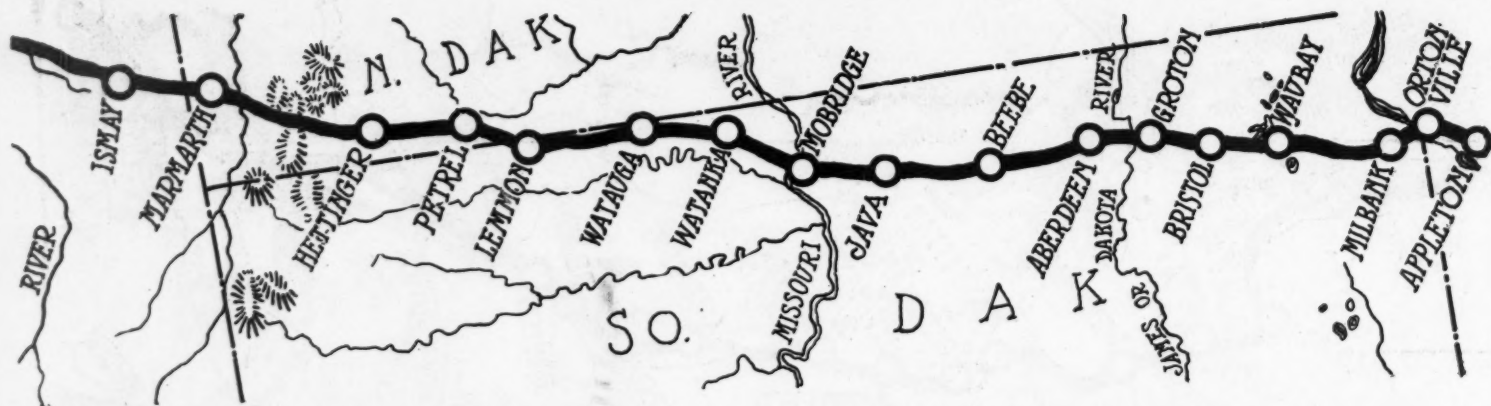
Right—A hard surfaced portion of the Yellowstone trail through famous Bridger Canyon near Bozeman, Mont. Here the trail follows the old Indian trail through a pass in the Rockies



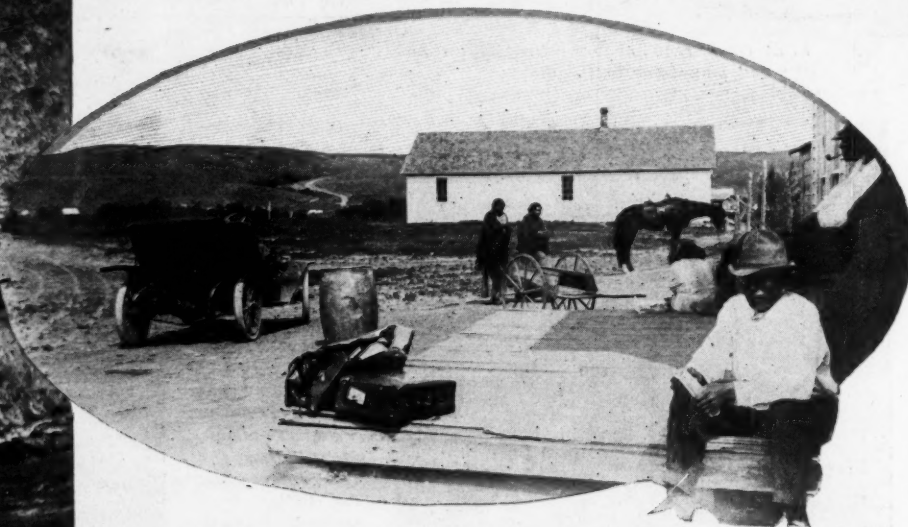
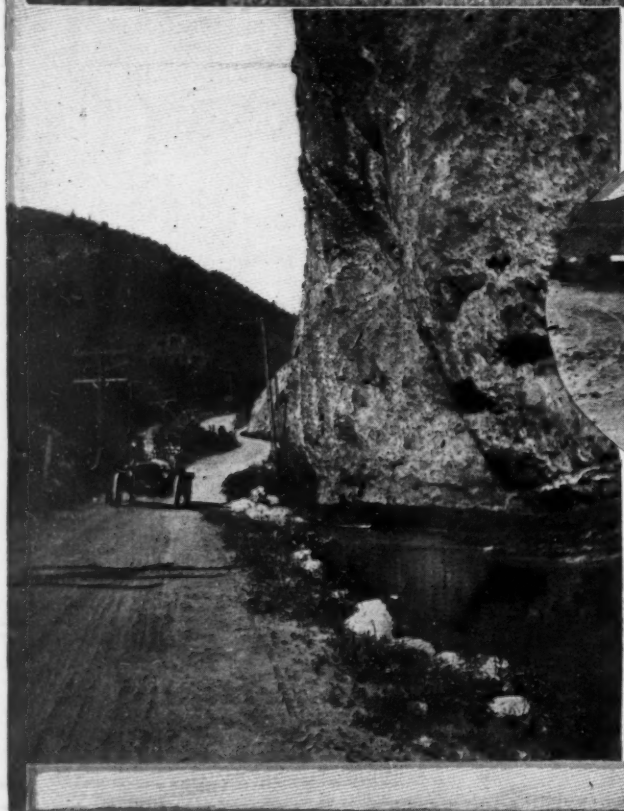
Right—Mountain camp at Rosebud Lake near Grasshopper Glacier, Mont. Largest glacier in Montana, in midst of seven highest mountains of Montana. These mountains are just outside Yellowstone Park

ing westward toward Billings, Mont., a distance of 303 miles, one passes the plains of Montana, a rich agricultural and stock country. From Billings to Gardiner, the
(Concluded on page 27)





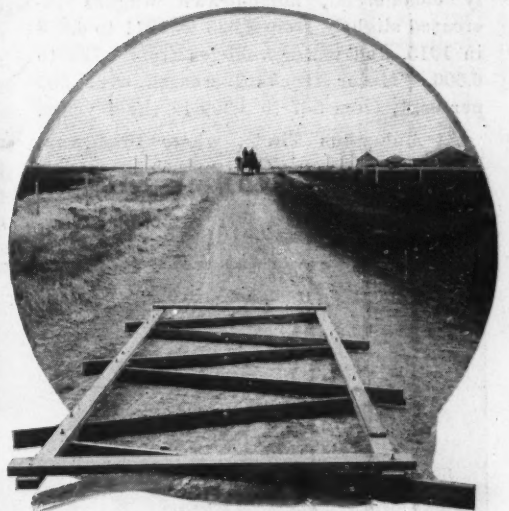
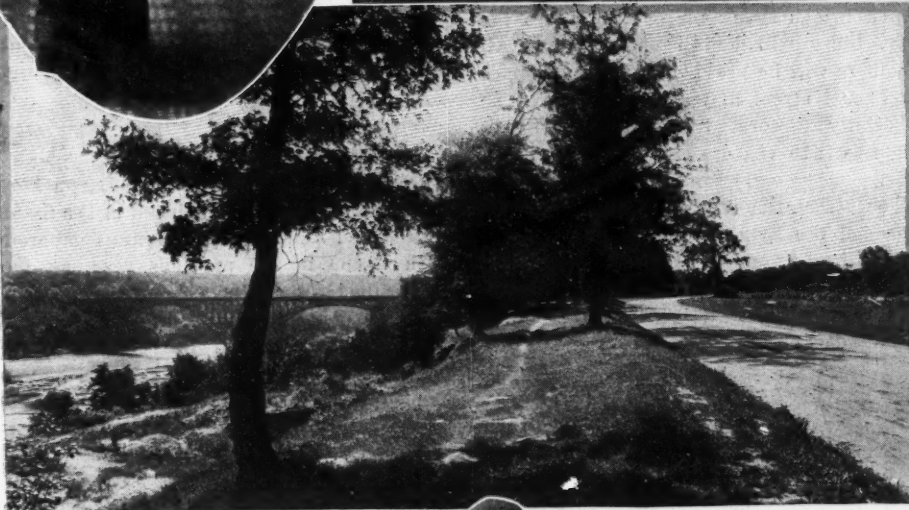
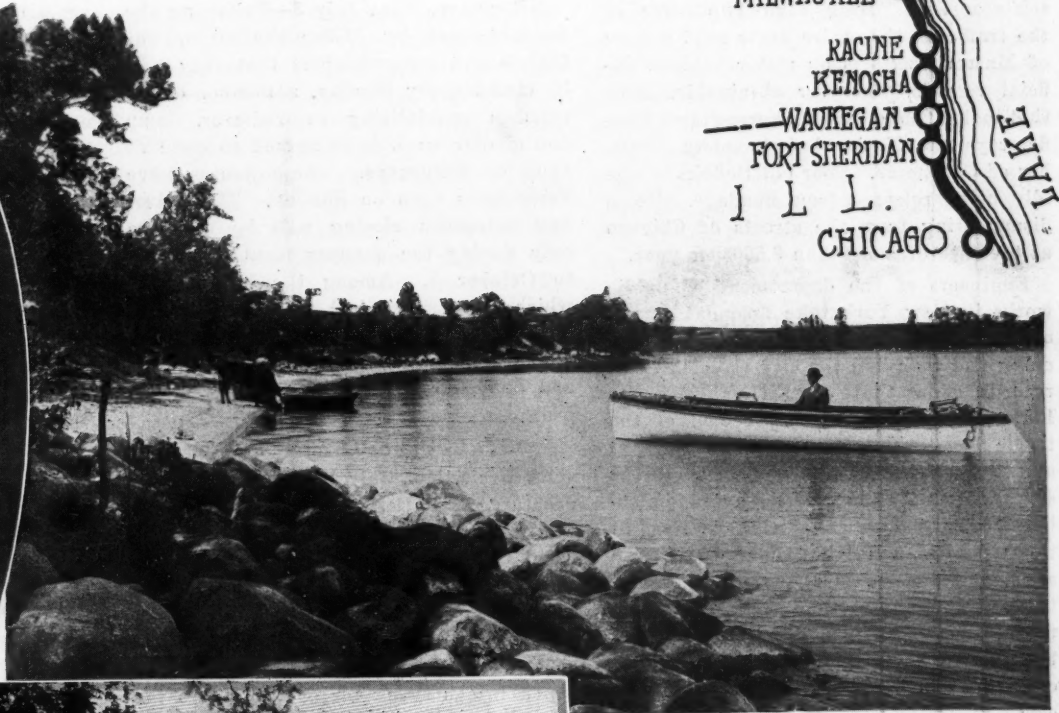
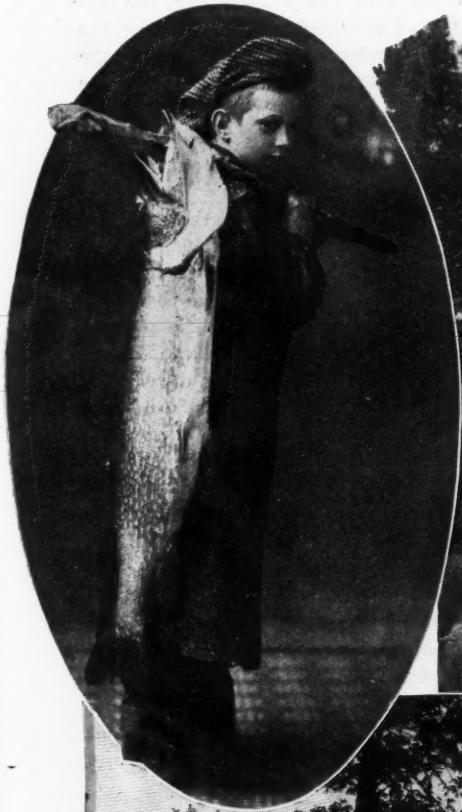
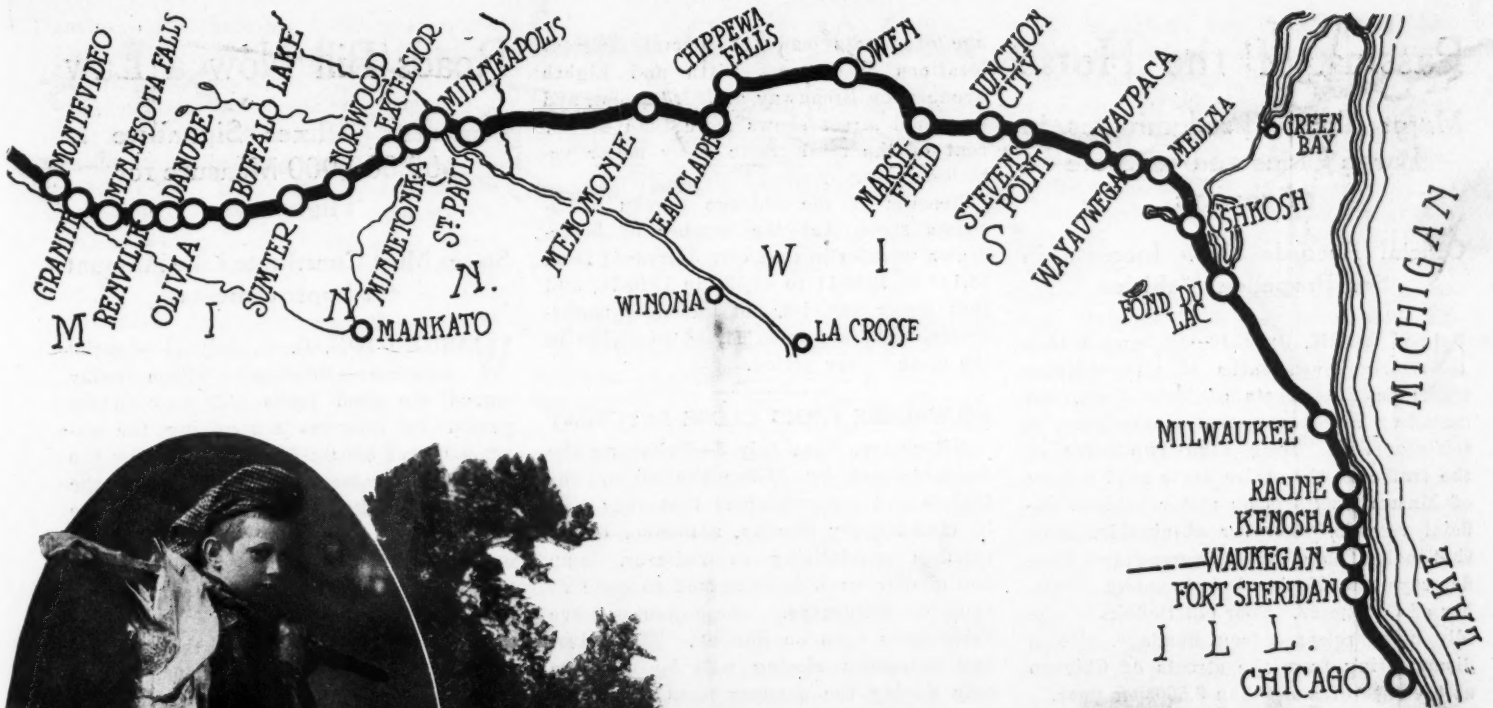
Farmers grading the last mile in North Dakota on trail day 1914.



Above—Standing Rock Indian Reservation. A few of the Indians use cars.
Left—Big Spring in Rocky Canyon, Yellowstone trail, east of Bozeman, Mont. There is no shortage of water on whole Yellowstone trail.



Left—A well built section of trail through Bowman County, N. D. Right—An ancient prairie trail south of McLaughlin, S. D. The kind of roads that have given way in the Dakota prairies to wide well graded dirt roads.



In oval—Sample catch from Big Stone Lake on the Yellowstone trail, Ortonville, Minn.

Above — East River Boulevard, Minneapolis, on the Yellowstone trail

Right—Giving Indian squaws a ride over the Yellowstone trail, Standing Rock Indian Reservation in South Dakota



Above—South Dakota shore of Big Stone Lake near Ortonville, Minn., on the Yellowstone trail

Below—A longitudinal planer, 26 feet long, with which the Yellowstone trail is finished and maintained in many sections. A most excellent tool for the work

Passing of the Horse

Motor Traffic Predominates in Large Cities and on State Highways

Official Records Show Increase in Self-Propelled Vehicles

NEW YORK, July 10—It is said that nearly seven-tenths of all vehicular traffic in the streets of New York, not including street cars and motorcycles, is self-propelled. More than two-thirds of the traffic on the entire State road system of Massachusetts is by motor vehicle. Official records, wherever obtainable, show that motor traffic exceeds horse-drawn traffic, says the National Automobile Chamber of Commerce. Poor old Dobbin is rapidly being released from bondage. He is disappearing from the streets of Chicago at the rate of more than 3,500 per year.

Engineers of the department of public works in New York take frequent counts of all kinds of traffic preparatory to widening and repaving the city streets. These records show that on Fifth avenue at Forty-second street, 91½ per cent of the traffic last December was motor vehicles and 8½ per cent was horse-drawn. In the 4 years from 1911 to 1915 the average number of horse-drawn vehicles passing at three points in Fifth avenue between 8 a. m. and 6 p. m. in 1 day, from Thirty-third to Fifty-ninth street, decreased from 2,577 to 1,670 or 35 per cent, while the average number of motor vehicles increased from 7,202 to 12,893 or 79 per cent.

On Eighth avenue, where traffic is largely commercial, horse-drawn wagons increased slightly from 4,528 in 1911 to 4,898 in 1915, and motor vehicles from 1,728 to 6,606. Motor trucks increased over 500 per cent, from 537 to 3,309 in the 4 years.

At Columbus Circle, where Broadway, Eighth avenue and Fifty-ninth street intersect, more than 67 per cent of the traffic was motor-driven last year. An aver-

age of counts made at several different locations on Second, Fifth and Eighth avenues, on Broadway at 163rd street, and on Canal street shows more than 69 per cent of the total traffic is by motor vehicles.

Records of the Chicago bureau of licenses show that the number of horse-drawn vehicles in that city decreased from 58,114 in 1910-11 to 49,582 in 1915-16, and that motor vehicles, not including motorcycles, increased from 11,088 to 43,129 in the same 5-year period.

MILWAUKEE FIRMS CLOSE SATURDAY

Milwaukee, Wis., July 8—Following the announcement by Milwaukee motor car dealers and garagekeepers that they will be closed every Sunday, a number of repairmen specializing in radiator, lamp and similar work have agreed to close at noon on Saturdays. These houses have never been open on Sunday. The Saturday afternoon closing will be effective only during the summer months and up to October 7. Among the larger firms which have subscribed to the agreement are the Auto Lamp & Radiator Co., Detroit Auto Radiator Co., E. K. W. Abraham and Longstaff & Meredith.

ST. LOUIS SHOW IN SPRING

St. Louis, Mo., July 10—The Auto Manufacturers and Dealers' Association of St. Louis has decided that instead of the usual fall show they will hold a show in the spring.

In the place of the fall show, usually held during the fall festivities, which include the historic Veiled Prophet parade which brings thousands of visitors to the city, there will be an open week. All members will be provided with show space on Locust street and all quarters will be especially decorated and arrangements made to take visitors along this thoroughfare.

The association at the last meeting also amended the by-laws to provide that two tickets be nominated for the annual election and so that all members of 6 months' standing be eligible to participate.

Roads Bill Now a Law

President Affixes Signature to \$85,000,000 Measure for Highways

States Must Contribute Like Amount for Improvements

WASHINGTON, D. C., July 11—Special telegram—President Wilson today signed the good roads bill recently passed by congress authorizing the expenditure of \$85,000,000 in 5 years by the federal government. The signing by the President marked the final act before the beginning of active co-operation between national government and the states in highway improvements on a country-wide program.

The condition attached to the expenditure of the government appropriation is that the states shall expend an amount similar to that apportioned to them for the indicated improvements. The signing was witnessed by members of the senate and house and representatives of various farmers' organizations. Officials of the American Automobile Association and Association of State Highway Officials also were present. The bill provides that in addition to the money to be spent in co-operation with the states \$10,000,000 shall be provided for roads in federal forest reserves to be spent at the rate of \$1,000,000 a year for 10 years.

The co-operative plan which became effective today is said to have sprung from the combined energies of the American Association of State Highway Officials and American Automobile Association.

25,399 SAXONS SHIPPED IN YEAR

Detroit, Mich., July 10—The Saxon Motor Car Corp., this city, shipped in the fiscal year ended June 30, 25,399 cars compared with 12,099 in the previous year, an increase of 110 per cent.

In no month of the last fiscal year did shipments fall behind the corresponding month of the previous fiscal year. In June shipments were 3,122 cars compared with 2,710 in June, 1915. A new record for monthly shipments was established in April, 1916, when 3,405 cars were shipped. Net earnings are estimated at \$1,250,000. This would be equivalent to about \$21 a share on the \$6,000,000 capital stock.

COPS WORK FIFTY-FIFTY

Boston, Mass., July 8—A speed trap operated on a fifty-fifty basis between two policemen on the dividing line between Hingham and Cohasset has just been put out of business through the publicity of the newspapers. All motorists going to Nantasket have to pass through both towns to get to the beach, and on an



CLEVELAND Business Men Inspect Jordan Car—Business Men of Cleveland, O., visited the new plant of Jordan Motor Car Co. last week and incidentally looked over the new car, distribution of which will begin in a few weeks.

ordinary day there are 1,000 cars on the road while Sunday and holiday motorists number thousands more.

A complaint was made to Chief of Police Bates at Cohasset that it seemed something was wrong and he began an investigation. In Hingham Patrolman Ira Adams was on duty and in Cohasset Patrolman Sidney Beal. When a car passed at night and a rear light was not burning Adams would signal Beal or vice versa with their flashlights, and the motorist was held up and summoned into court.

Chief Bates noticed that there was an increase in the motorists appearing in the Cohasset court and there was a decrease in Hingham. He found that his man made about all the arrests. A little more investigating showed that because all the Hingham police get regular salaries there are no witness fees, while the Cohasset police get fees. Each case nets the policeman \$1. Then he summoned Patrolman Beal and questioned him. The latter admitted that he was dividing fifty-fifty with his Hingham neighbor on every case where he secured \$1. He did not think there was anything wrong in it. Chief Bates looked up last year's record and found that about \$630 was collected in witness fees. A good day brings in from \$8 to \$10 for Beal. Chief Bates found there was no law against his patrolman's action, but he put it up to the selectmen. They put Beal on another route where he will not have to bother about traffic.

FROM RAZORS TO MOTORS

South Bend, Ind., July 8—It is unofficially stated that William Gillette, the millionaire razor king, will take over the Amplex Auto and Machine Works, one of the finest plants in the state in point of equipment, located at Mishawaka. The price it is said to be paid to Rudolph Kamm for the plant is about \$150,000. An option has been held on the plant for several months, but owing to an error in title the deal has been held up until the present time.

The new company will be known as the Gillette Motor Co. and will manufacture the Wilmo rotating sleeve motor, one of the latest and approved motor car engines, it is claimed. It has been patented by M. L. Williams, formerly of South Bend, now of Chicago. Mr. Williams will be interested in the plant and will move to Mishawaka, where he has purchased a residence. The company will also manufacture accessories.

Ray Austin, Mishawaka, will be the chief engineer of the company and C. E. Erickson, Chicago, will be the general manager. The Amplex was built a number of years ago and eventually was purchased by Hovey and Starrett, Detroit, Mich., later going into the hands of a receiver. It was purchased by Rudolph Kamm, one of the original stockholders, and operated as a job machine plant.

License Good 30 Days

Canadian Customs Department Gives Americans Month's Stay in Dominion

May Use United States Tag for That Length of Time

OTTAWA, Ont., July 8—The Canadian department of customs has issued an order to its collectors governing the passing in and out of cars. This is apropos of the reciprocal arrangements now existing between some Canadian provinces and certain of the American states regarding motor licenses. It is expected that these arrangements will result in a large increase in the number of motor tourists coming into Canada this summer.

The new regulations provide that when a non-resident owner of a car or motorcycle manufactured abroad desires to bring such a machine into Canada for a stay of not more than 1 month, he shall report at the customs house at the frontier port in Canada and present a certificate.

The collector, if satisfied that the machine is imported in good faith, may admit it without formal entry, furnishing the owner with a certificate, to be given up to the collector at the port of departure and returned by him to the issuer.

The certificate will contain a complete description of the machine, the owner in each case subscribing to the statement that "the machine is not to be used for any commercial or business pursuits whatever while in Canada and shall be exported from Canada within 1 month." If a report of exportation is not received within 40 days by the collector issuing the permit he is required to forward to the department at Ottawa a duplicate of the certificate.

ORGANIZE FOR ROAD PROMOTION

Milwaukee, Wis., July 8—The first concerted effort in Wisconsin to promote the construction of continuous highways or trunk roads, running north, east, south and

west, throughout the Badger state, has become cumulative through the permanent organization perfected by the Good Roads Association of Wisconsin at Milwaukee July 6. Organization work has been going on in all seventy-two counties of the state for three months.

Officers were elected as follows: President, C. C. Jacobus, Wauwatosa, Wis.; vice-president, Elmer S. Hall, Green Bay; treasurer, E. J. Perry, Fond du Lac; secretary, William H. Reese, Milwaukee; executive and field secretary, Francis A. Cannon, Madison; directors, the officers and Charles Lieske, Chippewa Falls; A. H. Zimmermann, Wausau; R. W. Davis, Bangor; Walter H. Reed, Racine, and A. R. Hirst, state highway engineer, Madison. One vice-president has been named for each of the counties in the state. Legislation to finance the construction of the continuous highway system by state, county and township aid will be sought from the 1917 Wisconsin legislature and this will be a principal object of the new association.

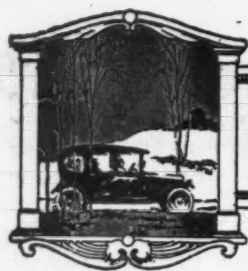
SMITH JOINS NEWMAN

Milwaukee, Wis., July 8—Frank H. Smith, assistant sales manager of the Chalmers Motor Co., Detroit, Mich., has resigned to become associated with the Harry Newman organization, Milwaukee, Chicago and Springfield, Ill., as manager of the northwest division of the big Chalmers distribution system built up by Harry Newman. As noted last week, Mr. Newman, since December 1, 1915, Chalmers agent in Wisconsin, northern Michigan and southeastern Minnesota, on July 1 was given the additional territory of Illinois and parts of Indiana, Iowa and Missouri.

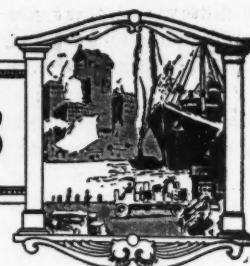
He will distribute about 5,000 cars in the combined territory during the fiscal year ending July 1, 1917. The northwest division will continue to be handled from the Milwaukee store of Harry Newman, at 700-706 Grand avenue, and the new territory from the Chicago Chalmers store and a new establishment at Springfield, Ill.



PROVIDING FOR THE BABY—The above illustration shows a Studebaker six equipped with a novel and practical baby's cab, which has been evolved by the car owner to keep the infant from climbing or falling out of the car



EDITORIAL PERSPECTIVES



Blue Sky Races

BLUE sky races, the drivers call them, and based upon overheard remarks from a score or more of the race drivers risking their necks for gold this season, there is going to be some vigorous and concerted action against the recurrence of such events. The speedways which set up prizes for amounts of money proportionate to the gate receipts, or those that guarantee prizes and fail to deposit the full amount of prize money before the race, are going to find themselves devoid of entries another year.

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ALREADY two tracks have received "never-agains" from the drivers who participated on them at their last meets. One of these set a race for July 4. The drivers were to receive half of the gate receipts in prizes. A lake let loose from the heavens on the morning of the fourth and the speedway management and newspapers set about to postpone the race five days. The drivers were righteously indignant, inasmuch as the A. A. A. officials were not consulted, and many desired a one-day postponement.

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WHAT were they to do under the present method of race management? Nothing but hang around 5 days. Their protests went unheeded, and the result was that the winner received

Used Car Is Good Investment

MUCH has been said for and against the used car by the prospective purchaser. The statement that a used car is a good investment is a broad one in the mind of the buyer, nevertheless there are reasons that will readily substantiate this statement.

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IN the first place the man who is buying a used car cannot afford the initial payment on a new car. Fifty per cent of the used car purchasers, particularly if it be their first automobile, are skeptical to a smaller or greater extent. They are usually under the impression that it does not pay to buy a used car.

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IT is an established fact that the depreciation is greatest in a new car. The volume of this depreciation depends, of course, on the handling of the new car in the hands of the various owners. Depreciation will vary according to the care and attention the new car has, sometimes to the extent of a hundred dollars or more in a single year. If all new car owners would give their cars the proper attention the used car would be much easier to sell both for themselves and the dealers. However, to go back to the used car. A used car purchased for \$500 at the present time should not depreciate more than \$100 within the following year if given good care.

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ANEW car, strange to say, purchased for \$500 will have less depreciation in proportion to the car purchased for \$1,000 or more. To quote an instance, a new car was purchased last year for \$1,575. At the present time this same car can be bought for \$750, which shows a depreciation of more than 50 per cent. If the price of this car had been \$500 the car would probably have brought about \$400 at the present time. If three of these \$500 cars had been purchased with an investment of \$1,500 the total depreciation would have been approximately \$300, or 20 per cent. While the used car also suffers when the manufacturer produces a new model with a reduction in price it appears to be so small that it does not materially change the market value of the car.

the paltry sum of \$408.75, and other place winners were rewarded accordingly. It did not even come near paying their expenses. A year ago the drivers met at Indianapolis and took steps towards perfecting an organization. It appears that the enthusiasm for organizing died out due to the fact that the races of that year were handled in a manner satisfactory both to the drivers and the speedways.

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NOW the old wound has been cut afresh and the drivers have signified their intentions of reviving an organization not only as a protection for themselves, but as a channel for pre-race arbitration to avoid misunderstandings and disputes and have everything agreed upon before the race, instead of at the starting hour, or two hours after the starting time, as was the case at Minneapolis on July 4. In boxing, golf, tennis, in fact any professional sport other than motor car racing, monetary guarantees are made which protect the participants thoroughly against financial loss. Their risks are petty compared with those of the race drivers. It is unreasonable—yes, it is inhuman—to expect a driver to stake his life on an unknown quantity and at the end find that he has not won enough to pay his hotel bill. He is rightfully entitled to know the ante before he gambles for his life.

Maintaining Our Roads

MAKING roads is one thing; maintaining them is another.

That we need good roads goes without saying; that we need plenty of them is attested by the good roads movement everywhere. With the coming of the motor car has come an era in roadbuilding such as this country never before experienced. Every community is anxious for good roads if it has not a system of such thoroughfares at present. If it has good roads, then it wants to better them. A large percentage of our roads are built with money obtained from bond issues, which the people have voted to issue. Right there comes the hitch. Communities or counties build roads and in mapping out their campaign or program they use the entire bond issue for building the road and do not lay aside for maintenance.

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SOME counties that are not gifted with any more assessable property than will adequately take care of the expense of running the county government and when a bond issue of several hundred thousand dollars is issued, it takes about all the revenue that can be raked and scraped together to pay the interest on these bonds. Why not make some provision for maintenance? If the interest is all that can be paid—and the bonds themselves must be redeemed from the same source that the interest comes from, although the promotion of good roads enhances property values and makes possible greater revenue from taxation—then how are these good roads just built to be kept in repair?

✻ ✻

IN England and numerous other foreign countries as much attention is given to maintenance as to building roads. England, for example, builds good roads, using Scotch granite. Then a patrol is put on each road, each man having about 6 miles to keep in repair. He does not let any worn places become bad, but keeps watch of the road after storms. Such a practice is an investment. Why not try it in this country? Build roads—plenty of them—but maintain them. Keep them good roads.

\$16,000,000 in Motor Fees on Road Building in 1915

Nearly Two Million and a Half Vehicles, or More Than One for Every Mile of Rural Road, Registered

WASHINGTON, D. C., July 8—Ninety per cent of the registration and license fees paid in 1915 by motor car owners to the States, or \$16,213,387, was spent for the building and maintenance of county and state roads, according to a compilation just published by the office of public roads, United States department of agriculture. In all, 2,445,664 motor vehicles were registered in that year and their owners paid a total of \$18,245,713 for registrations and drivers' and dealers' licenses. This is an increase of \$5,863,760 over 1914, and an increase of 734,325 in the number of vehicles registered. Motor license fees now defray nearly 7 per cent of the total amount spent on rural road and bridge building, whereas in 1906 the income from this source was less than three-tenths of 1 per cent of the total expenditure.

The growth of the volume of fees and registrations is noted by the fact that in 1901 New York, the first state to require fees, collected only \$954. In 1906 only 48,000 cars were registered throughout the entire United States. By 1915, however, the number had jumped to the figure given, so that there is slightly more than one motor car registered for each of the 2,375,000 miles of road outside of the incorporated towns and cities.

Car and Mileage Ratio Varies

The relation between cars and road mileage varies widely in different sections. There is only one motor car for every 6 miles of rural road in Nevada, but nearly six motor cars for every mile of such road in New Jersey. There is an average of one motor car registration for every forty-four persons in the United States. Iowa apparently leads, however, with one motor car for every 16 persons, while only one for every 200 persons is registered for Alabama.

It must be understood, however, that the figures of registration do not necessarily represent a total number of cars, as some of the States do not require annual registration, others group passenger and commercial cars and motorcycles in their accounts, while still other states do not require registration of motorcycles.

There is great inequality in the registration fees charged by the different States. The average for the United States was \$7.46. The state of Vermont, however, secured in 1915 a gross revenue of \$18.10 for each motor car, while Minnesota received only about 50 cents annually for each car. In Texas and South Carolina no annual registration fees are collected, the only requirement being a county fee of 50 cents and \$1 respectively for perennial registration. Most of the states, however, also levy annual taxes on motor vehicles

and this adds importantly to the public revenue contributed by the owners of motor-propelled vehicles.

In the use of fees, however, there seems to be a general policy of applying the major part of the money collected directly to road betterment. In forty-two of the states of the union, all, or the major portion of the motor-vehicle revenue, must be expended for the construction, improvement, or maintenance of the public roads, or for the maintenance of the state highway department. In 20 States, all or the major portion of the net motor-vehicle revenues are expended by or under the supervision or direction of the state highway department. In seven States, one-half to one-fourth of the state motor-vehicle revenues are expended through the state highway department, and the remainder by the local authorities. Many states, in addition to applying license fees to road construction expend for this purpose a large part of the fines and penalties collected from owners.

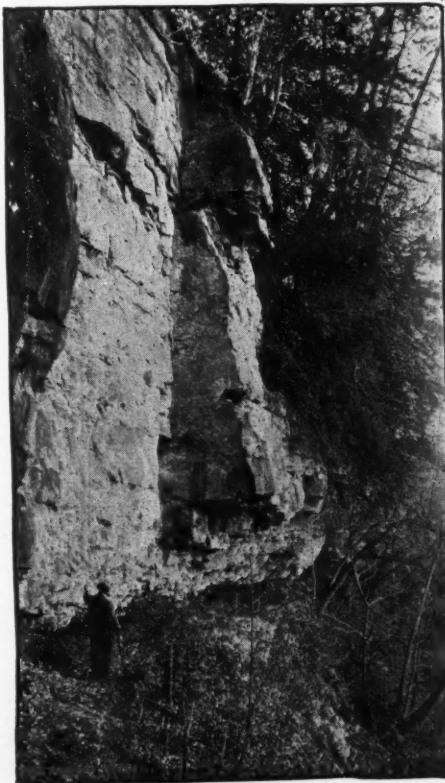
In the number of registrations New York State led in 1915 with 255,242;

Illinois was second with 180,832; California third with 163,797; and Pennsylvania fourth with 160,137. In gross revenues received from this source, however, California led with \$2,027,432; New York was second with \$1,991,181; Pennsylvania third with \$1,665,276.

CAMPAIGN FOR SAFETY

Every day the press chronicles the death or serious injury of a driver or member of a motor party due to a reckless attempt to cross a railroad track ahead of a flying express train. In 1915 1,086 lives were lost in grade crossing accidents from this cause alone. To impress upon motorists the utter senselessness of accidents of this kind and to minimize the number, the passenger department of the Denver & Rio Grande Railroad has gotten out a note of warning calling upon drivers to "Take No Chances at All" and to "Stop, Look and Listen." This is being displayed in public and private garages and repair shops and is being distributed among owners and chauffeurs in the cities located along that line.

See America First — • • • See America Now



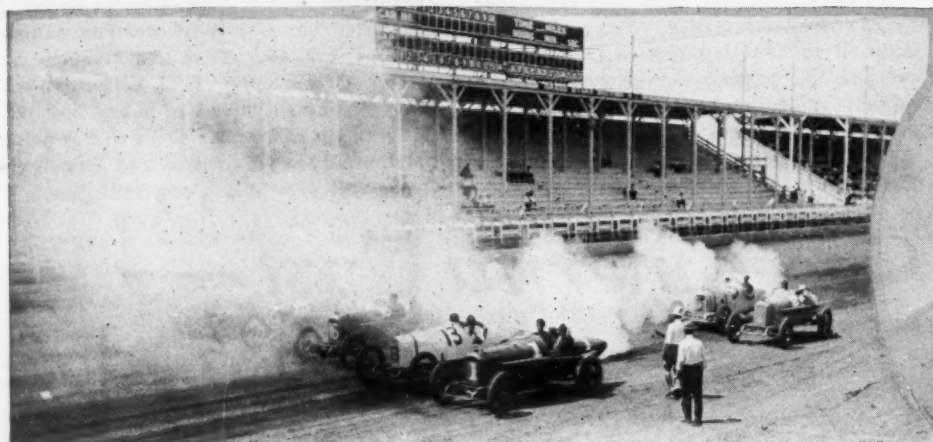
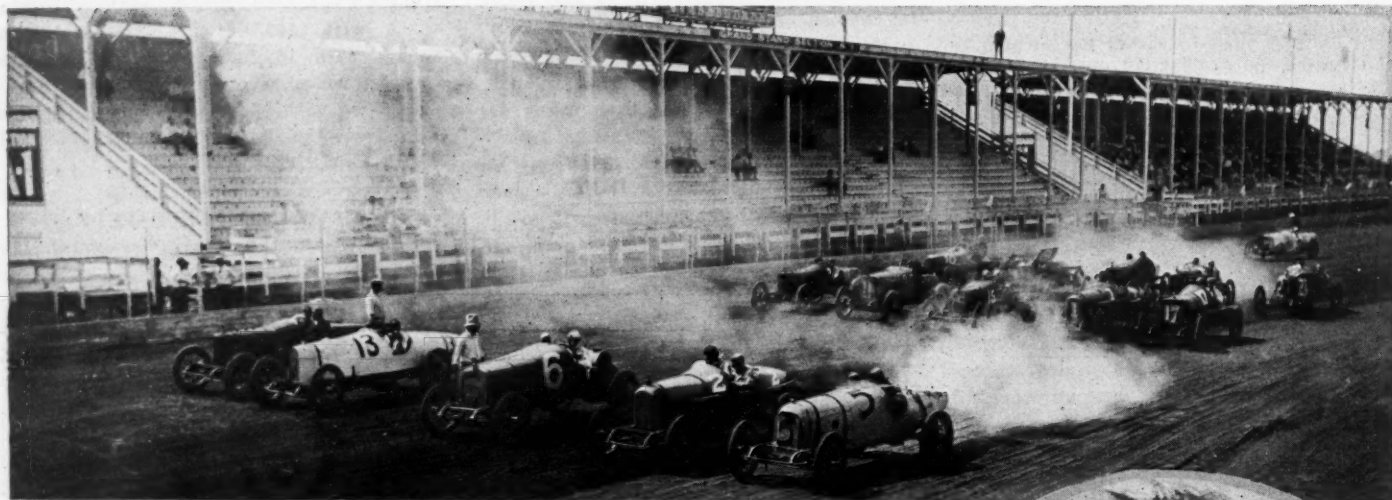
EDITOR'S NOTE—This is the eighty-sixth of a series of illustrations and thumb-nail sketches of the scenic and historic wonders of America to be published in Motor Age for the purpose of calling the attention of motorists to the points of interest in their own country.

NO. 86—SHADES OF DEATH ON ROCK RIVER, 60 MILES WEST OF INDIANAPOLIS, IND.

DAME Nature is a wonderful sculptor. She chisels away with monotonous precision, but her work, when finished, if it ever is, bears silent testimony to her skill. Everywhere one goes he can find the evidence of her work, one being shown on this page at the left. This is known as the Shades of Death, and is found on the Rock River about 60 miles west of Indianapolis, Ind. Here, hewn out of the rocky ledge is the face of what we are taught to recognize as the shadow of death. The resemblance is uncanny. This section of Indiana is a great rendezvous for tourists and the scenery along the Rock River in this vicinity is varied and interesting. The particular spot shown at the left is visited by many tourists each year.

Wilcox Wins in Sioux City Gumbo-Plowing Carnival

Clods of Earth Break One Driver's Nose and Cut Scalp of Another Contestant



Above—Lined up for start of the 50-mile race. Below—Starter Wagner waves them off for the 10-mile event



Howdy Wilcox, who captured the Sioux City 50-mile event

SIoux CITY, Ia., July 8—Driving his Premier through clouds of dust and volleys of flying clods, Howdy Wilcox in a Premier finished first in the feature race here Saturday. The event was scheduled as a 100 mile race but, after driving in the 10 and 20 mile preliminary events the drivers agreed to cut the distance in half. Their claims that the track was in no condition for the longer distance seemed justified and the A. A. A. officials consented to the change.

Manager E. R. Schultz stated that he was not consulted in the matter of the change and asked Starter Fred Wagner to have the men go the full distance. Mr. Wagner pointed out that the dusty condition of the track made it entirely too dangerous and refused to permit the carrying out of the original program.

Wilcox's time for the 50 miles was 40 minutes and 59 seconds, showing an average rate of speed of 72.57 miles per hour. His mount is fast and the slow time recorded in the feature race of the day is

By Ralph B. Ross

indicative of the condition of the course. Dave Lewis was second, Art Johnson third, D'Alene fourth and Billy Chandler fifth.

Wilbur D'Alene, in his 16 valve Duesenberg, finished ahead of the field in the 10 mile race. He drove a smashing race, taking the lead at the first turn and was never headed. He was trailed by Charlie Merz in a Peugeot, Dave Lewis in a Crawford and Howdy Wilcox in a Premier.

Wilcox got away in the second race, the 20 mile sprint, just back of D'Alene. He followed the white Duesenberg for two laps and on the third circuit just as he reached the stands passed the Duesenberg. He drove a sensational race and finished first with an average of 78.4 miles per hour. D'Alene's average for the 10 mile event was 79.6 miles per hour.

The spectators, what few there were of them, were given a run for their money. Because of the dense clouds of dust stirred up by the racing machines it was impossi-

ble to see what was happening on the turns. It seemed impossible that drivers could pilot their mounts into the curves at the rate of 75 miles per hour and still avoid a spill. Several times a driver was forced to turn his car into the small ditch on the inside curve to allow one of the others to pass.

The only accidents of the day, with the exceptions of a few minor bruises and cuts from flying pieces of gumbo were when Hughie Hughes sustained severe scalp wounds from a flying piece of dirt and Dan Columbo, struck by a large piece of the track, suffered a broken nose.

Jack Gable was the hard luck driver of the day. He was forced out of the 20 mile race after making two tire changes and in the 50 mile race was put out of commission after leading the field from the ninth to the twenty-second lap. He was driving the Burman Special. On the south

turn in the first lap he drove his blue speeder into the ditch on the inside curve of the track to avoid a collision with Art Johnson. It looked like he was "cookoo," but he managed to right his mount and get started again.

He passed Wilcox on the north turn of the eighth lap, taking the lead at that time and holding it with almost a lap to spare until the forty-fourth mile, when he was forced out of the race with a broken piston. He had limped round for two laps, his lead enough to insure first place. His pit men, thinking Wilcox was only a few feet in the rear instead of a lap, signaled Jack to "beat it." He did, but was forced out of the race on the next lap.

Hughie Hughes in the Devlin Duesenberg was forced out of the contest with a broken bearing. He turned three fast laps and had gone from sixteenth position to seventh when he had to quit. He had worked wonders with his car, welding a new cylinder block and manufacturing an entirely new set of bearings out of babbit. At ten o'clock on the morning of the race the Duesenberg was scattered all over the garage. The work was finished so that the car arrived at the track just ten minutes before the time set for the 50 mile race.

The experiment of holding motor car races and of furnishing the purse by giving the drivers half of the total admission was not a success at Sioux City. There were only a few more than 2,000 people in the stands and the total receipts were less than \$3,500. The drivers' end of the money being less than they would have received at a meet on some half-mile tracks in this section. First money in the 50 mile race was only \$408.75.

Whether or not there will be other races on the Sioux City track remains to be seen.

ADD TO G. M. DIRECTORATE

Detroit, Mich., July 10—Further revision of the directorate of the General Motors Co. was made at the quarterly meeting, when Walter P. Chrysler, the newly elected general manager of the Buick company, was made a director, following the resignation of Samuel F. Prior, who is prominent in the Union Metallic Cartridge Co. and the Remington Arms Co.

Thomas Neal, former president of the organization and chairman of the board, is again an officer by his election as vice-president at this meeting. He will share the duties of the vice-presidency with Arthur G. Bishop, the Flint banker, who was elected a vice-president last fall.

In placing Chrysler on the directorate, another of the General Motors subsidiaries was given representation on the board. Not long ago W. C. Leland of the Cadillac company, was elected to the board, and with the placing of W. L. Day of the General Motors Truck Co., and Fred W. Warner of the Oakland Motor Car Co. also on the directorate, there are four of the sub-

sidaries directly represented. These recent director changes followed the resignations of J. J. Storrow, Albert Strauss, Emory W. Clark and S. F. Pryor. The revised board as it now stands follows:

Pierre du Pont,	J. J. Roskob.
chairman.	F. W. Warner.
J. H. McClement.	W. L. Day.
C. S. Mott.	W. C. Leland.
C. W. Nash.	W. P. Chrysler.
Lammont Belin.	Thomas Neal.
A. H. Wiggin.	W. C. Durant.
C. S. Sabin.	L. G. Kaufman.
J. A. Haskell.	A. G. Bishop.

TO CUT GOTHAM TAXI RATES

New York, July 10—Taxicab rates in this city are to be cut as a result of the decision of Chicago interests to combine with local ones to give service on a cash basis. According to the plans, 200 cars will be put in service and the lowering of rates will be consummated through having only one charge, regardless of the number of passengers carried.

The new concern will charge for one, two, three, or four passengers, 20 cents for the first third of a mile, 10 cents for each succeeding third of a mile; 1 mile, 40 cents; 2 miles, 70 cents; 3 miles, \$1; 4 miles, \$1.30; 5 miles, \$1.60.

Present rates for one or two passengers are 30 cents for first ½ mile and 10 cents for each additional quarter of a mile; 1 mile, 50 cents; 2 miles, 90 cents; 3 miles, \$1.30; 4 miles, \$1.70; 5 miles, \$2.10; for three or more passengers, 30 cents for the third of a mile, 10 cents for each additional sixth of a mile; 1 mile, 70 cents; 2

miles, \$1.30; 3 miles, \$1.90; 4 miles, \$2.30; 5 miles, \$3.10.

The new company will be known as the Brown Taxicab Co., and will be run jointly by the managers of the Yellow Taxicab Co., Chicago, which has been successful, and the Town Taxi Co., Inc., and the Club Cab Corp., this city. The Walden W. Shaw Livery Co., Chicago, will build the taxis and will have an interest in the new concern.

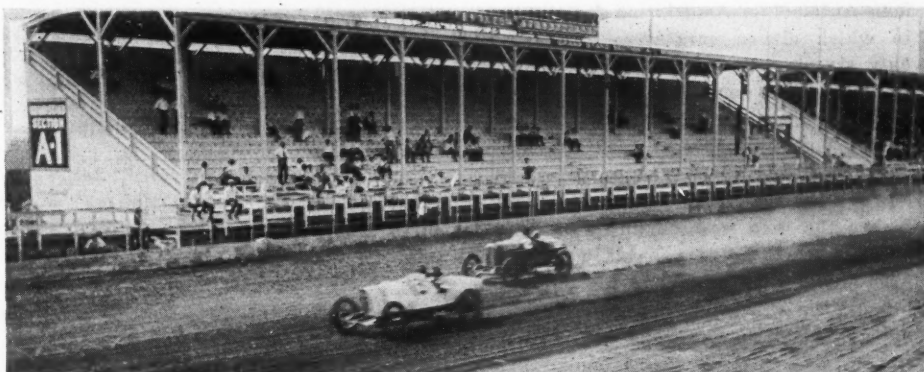
SALESMANSHIP CONGRESS OPENS

Detroit, Mich., July 10—The first national meeting of men whose vocation is selling began today in this city. It is styled the World's Salesmanship Congress and continues until Thursday. While the majority of those who will take part in the sessions are connected with American industries, several foreign representatives are scheduled to participate, giving the affair a world-wide aspect.

Most of those who are on the convention program are experienced in sales work and the discussions are not confined to any trade or group of trades. Sales executives and managers will give their experiences on many pertinent subjects.

The convention opened today but addresses were made in two dozen churches yesterday on "The Ethics of Salesmanship." These talks not only served to spread the uplift idea of modern salesmanship among the people generally, but also made known to the city that the congress is being held.

The same afternoon the formal opening was held in the Board of Commerce Building and the regular work of the sessions.



Above—D'Alene and Wilcox plowing the dirt side by side. Below—D'Alene in the pits at the end of the 10-mile event, which he won

Haibe in Ogren Wins at Grand Rapids

Rough Track Makes Race Slow—DePalma Finishes Second— Mile-a-Minute Speed Lacking



Flying start of the Grand Rapids 100-mile race

GRAND RAPIDS, Mich., July 8—Notwithstanding the fact that he went through the fence and drove over a pile of lumber, nearly hit the ambulance that was rushing to the spot to offer aid, and drove outside the course until he came to a gate where he could get back on the track, Ora Haibe, driving an Ogren, the same one with which Otto Henning went through the fence at Benton Harbor July 4 and suffered serious injury, lost less than one lap of his two-lap lead over Ralph de Palma and came back and won the 100-mile dirt track race here this afternoon, pulling down \$1,000 in prize money for his rough ride.

Track Was Outlaw

The track at Comstock Park has been an outlaw, but the ban was lifted for one day and sanction was given by the American Automobile Association for the event in which eleven cars were entered, but only six started. The 1-mile oval looked to be in fair condition before the start of the race. Considerable work had been done on it and several tons of calcium chloride sprinkled on the course to keep down the dust. Then just a few minutes before the race was scheduled to start J. Pluvius got in a little of his work, which also bid fair to keep the dust well laid, but all the efforts of the several dust-layers availed little and from the very start the air was so thick with "mud with the water squeezed out" that spectators and drivers were nearly choked. In fact when the race was over those in the grandstand and press stand presented practically the same grimy countenance as the drivers themselves.

Andy Burt in a Stutz got the pole position in the drawing held last night. The Vernon Special, a Cornelian in everything except the name, with "Dutch" Kline as driver, was next, and Ralph de Palma in his Mercedes third in the first row. The second and last row had Haibe on the inside, driving an Ogren, Andrus' Mercer next and Ralph Mulford in a Hudson Super-six third. After the flying start positions changed, de Palma leading at the end of the first lap, Burt's Stutz being



Ralph de Palma in his Mercedes

By William K. Gibbs

second, Haibe's Ogren third, Ralph Mulford's Super-six fourth, Andrus' Mercer fifth and Kline's Vernon Special a poor sixth. These same positions were held for thirty-one laps, none of which were especially spectacular. De Palma's time at the end of 10 miles was 9 minutes 49.6 seconds; at the end of 20 miles 10 minutes 45.8 seconds and for 30 miles 30 minutes 40.4 seconds.

At the end of the thirty-second mile the first three positions reversed completely. Up to that time it had been de Palma, Burt, Haibe. Then it changed to Haibe, Burt, de Palma. These three kept well bunched, the latter two much of the time hidden in Haibe's dust. The same relative positions were held by these three until the end of the sixty-eighth mile,

when Burt made a stop and de Palma jumped into second place. Mulford was running a good fourth, although the Super-six did not sound exactly right, and at 16 miles stopped to replace a plug, being lapped by de Palma four times before he got away. He stopped again at the end of 50 miles and in replacing plugs broke a pet cock and found enough other work to do to keep him in the pits until he was twenty-nine laps behind the leader when he finally got started again. He run one more lap, stopped again, then started and kept steadily at it until flagged in the eighty-sixth lap.

Haibe's time for 40 miles was 40:51.4; for 50 miles, 51:02.2; for 60 miles, 61:21.6; for 70 miles, 1:11:43.4; 80 miles, 1:22:09.8; 90 miles, 1:32:40.8.

Haibe Goes Through Fence

Excitement came in the 94th mile. De Palma, Mulford and Burt were bunched on the north turn just as Haibe, who was driving a fast pace and taking the turns with less care than the others came into the cloud of dust that enveloped the first three. In an instant Haibe saw the tail end of the Mulford Super-six immediately in his path. He pulled sharp to the right, left the course, smashing through the fence and scattering a pile of lumber just over the fence. His mechanic, J. W. Staples, jumped out, cranked the car and they finished climbing the pile of lumber, drove along the fence to a gate, came back on the track and lost less than a lap. He had three laps on de Palma when the accident happened, so finished easily in the lead. Some idea of the roughness of the track may be gained by Mulford's statement that he never knew he was struck until he was flagged several minutes after and found the tail of his car and some of the rods on the back of the Hudson badly bent. He said he thought it was a rough spot in the track.

There was little policing of the course. When Haibe went through the fence several hundred started for the spot, crossing the track from the stands and elsewhere. Few stops were made. The Vernon Special was flagged at the end of 30 miles, being

HOW THEY FINISHED

Pos.	Car	Car and Driver	Time	Prize
1	9	Ogren, Haibe.....	1:46:03.4	\$1,000
2	2	Mercedes, De Palma..	1:47:59.0	500
3	1	Stutz, Burt.....	1:50:27.2	300
4	24	Mercer, Andrus.....	2:05:14.8	200
5	14	Hudson, Mulford....	Flagged	
6	4	Vernon Spl., Kline...	Flagged	

about 25 miles behind the leader at that time. Mulford stopped at the pits three times, each time for spark plug trouble. Andrus came in at the end of 12 miles for goggles and at 43 miles for a right rear tire. Burt came in once for engine adjustments in the 68th mile. De Palma stopped at the end of 75 miles for a right rear tire. Haibe made no pit stops. De Palma said he never drove such a rough 100 miles in his life. The right rear shock absorber on the Mercedes broke early in the race and made riding very uncomfortable for Ralph and his mechanic. All of the drivers complained of soreness after the race on account of the choppy condition of the track.

In a motorcycle event just before the 100-mile race, Joe Walters coasted the last 300 feet to win, having run out of gasoline. An attempt to stage some other events tomorrow is to be made if sanction can be gotten. De Palma had to ship to Omaha tonight to be ready for next Saturday's race there, and as Ralph Mulford does not drive on Sunday these two will not be seen tomorrow even if sanction is obtained.

HAIBE WINS TWO EVENTS

Grand Rapids, Mich., July 9—Because some of the events scheduled yesterday were not run, sanction was given at noon today by the A. A. A. for three short races, two of which, the 10- and 25-mile events, being won by Haibe in an Ogren, but not at very fast pace because the track was cut up so badly in yesterday's 100-mile race. Haibe's time for the 10 miles was 11 minutes and 1.4 seconds, and for the 25 miles, 25 minutes and 21 seconds.

Andy Burt in a Stutz took the 15-mile event in 16:49.8. Ira Vail answered a hurry call to come here from Sioux City and had expected to drive Mulford's Super-six, but when he arrived found Mulford had shipped to Omaha, so Vail borrowed a stock car from a local man and did a 2-mile exhibition in 2 minutes and 14 seconds.

PIKE'S PEAK HILLCLIMB

Colorado Springs, Colo., July 10—A trio of Hudson Super-Sixes is being prepared for the Pike's Peak Hillclimb, and two of them have been officially entered. One of these is to be driven by Ralph Mulford, whose teammate probably will be F. A. Patterson, Stockton, Cal.

The first running of this annual contest over the highest highway in the world will be August 11-12. The bill includes a Class E event, 230-cubic inches and under; Class C, 231- to 300-cubic inches, and a Class D free-for-all. The latter event is for the Penrose challenge trophy given by Spencer Penrose, valued at \$1,200, and \$3,000 to be divided between the winner and second place.

The course measures 12 miles, 22,000 feet, and in order to negotiate this climb

to the summit of the famous mountain, cars will have to conquer a rise of 6,686 feet. With a maximum grade of 10.5 per cent and an average of 7 per cent, and with numerous turns, an exciting contest is assured. Furthermore, it is a contest in which driving skill will be likely to play a big part.

Each of the two Hudsons now entered is nominated for the 231- and 300-cubic inch class and the free-for-all. In addition to the Hudson cars, the entries to date include three Cadillacs, a Studebaker special, a Peugeot, and it is expected that three Chalmers cars and several Kings now in course of construction will be entered shortly, also a number of other specials from Detroit and Indianapolis factories, which the makers are not ready to announce as yet.

YELLOWSTONE TOUR LIST GROWS

St. Paul, Minn., July 8—More Twin City motorists have enlisted in the tour that starts for Yellowstone park July 20, increasing the number of entrants to twenty-seven. Before the starting date, however, Chairman W. W. Smith of the committee in charge expects the full quota of fifty machines will have joined by the time the tour starts.

Mandan, N. D., will send a delegation of twenty-five cars to represent the motor and commercial clubs of that city. Three entrants have been secured from Fargo, while a number of other cities along the route of the National parks highway are to be well represented on the trip.

"There will be some unusually interesting nights for the entertainment of the tourists," says J. P. Hardy, Fargo, who is much interested in the sociability excursion to the western playground. He has been working hard on arrangements. Mr. Hardy said last night that, besides the bridge dedication ceremonies at Medora, N. D., such places as Detroit, Minnesota, Bismarck, Glen Ullen, Mando and

Beach, N. D.; and Miles City, Billings, Glendive, Hunters' Hot Spring, Custer and Livingston, Mont., will be well prepared for the visitors.

It was announced last night that an additional control will be established at Beach, N. D., and an hour will be spent there. Beach is the home of President Reave of the North Dakota State Automobile Association, who requested this stop.

405.8 MILES IN 10:54

Uniontown, Pa., July 7—C. W. Johnson and Martin Murphy returned yesterday evening at 6:53 o'clock from their Elks' pathfinding trip to Baltimore, 405.8 miles, in Mr. Johnson's racing car, The Greyhound, making the round trip of 405.8 miles in a total of 10 hours and 53 minutes, or 7 minutes less than their scheduled time.

The trip was made without any accidents of consequence except for the throwing of a tire on this side of Hancock, Md., causing the car to describe a complete circle. The maximum speed made by Johnson was 86 miles an hour, setting a record for time over this section of the National Pike.

BREAK WORLD'S RECORD

Omaha, Neb., July 10—Two world's records, that of the 25 miles and the 5 miles, were broken on the Omaha board speedway yesterday afternoon by Eddie Rickenbacker and Dario Resta, driving the Maxwell and the Peugeot, respectively.

Rickenbacker's record for the 25 miles was 14 minutes, 36.47 seconds, against 17 minutes, 30.4 seconds, made by Barney Oldfield at Indianapolis in 1914. Resta's record for 5 miles was 2 minutes, 44.82 seconds, against the former record of 3 minutes, 11.75 seconds, hung up by Caleb Bragg at Los Angeles in 1912. Resta qualified for the 150-mile race here Saturday by averaging 110 miles per hour.

Aftermath of July 4 Races

COLORADO ROAD RACE

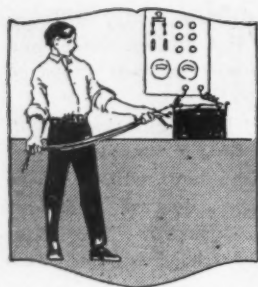
Denver, Colo., July 5—A 132-mile road race, with 21 cars entered, was run yesterday afternoon from Denver to Laramie, Wyo., along a scenic highway skirting the Rockies the entire distance. Harold Brinker, Cheyenne, Wyo., driving a Cadillac Eight, won first place, in 2 hours, 55 minutes and 10 seconds, lowering the former record by 33 minutes. D. B. Southard, in a Case, finished second, in 3:09:54; Sam Marcus, in a Haynes, third, in 3:11:09; Baxter Rarie, in a Pathfinder, fourth, in 3:11:25; Heinie Jones, in a Roamer, fifth, in 3:13:01. These four were Denver drivers.

All the drivers who covered the entire course were given a lively reception in Laramie, where the start of a 3-day fron-

tier days celebration furnished an abundance of wild west spirit in which the drivers participated.

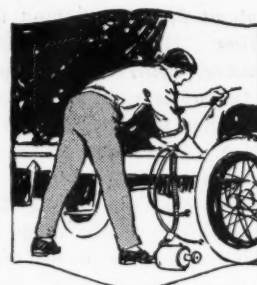
ALLEY WINS AT BENTON HARBOR

Benton Harbor, Mich., July 6—In the 50-mile race staged here on July 4 Tom Alley, driving the same Marmon that Joe Dawson won the Indianapolis 500-mile race with in 1913, won, his time being 64 minutes and 14 seconds. The Marmon car was once owned by Charles Erbsstein, noted Chicago criminal lawyer, but now is the property of J. White, Chicago. Otto Henning, who piloted the Ogren that Alley has been driving in several meets, went through the fence and was badly injured. Haibe will drive the Ogren at the Grand Rapids 100-mile race Saturday in Henning's place.



Electrical Equipment of the Motor Car

By David Penn Moreton & Darwin S. Hatch.



Editor's Note—Herewith is presented the second installment of a weekly series of articles which began in *Motor Age*, issue of June 29, designed to give the motorist the knowledge necessary to enable him to care for and repair any and all of the electrical features of his car, no matter what make or model it may be. The information it is planned to offer in this series will be equally valuable to the repairman, whether he be skilled in things electrical or have a very limited acquaintance with them. For the sake of the majority of readers, whose real knowledge of electricity is more general than definite, it has been thought wise to begin with the very first principles of electrical phenomena, in order that owners may be able to follow the circuits on the electrical systems of their cars with the certainty that they are right. To the lay reader, the first few installments of this series are the most important, for without them, wiring diagrams, trouble charts and repairing instructions are almost useless; with the groundwork well laid by study of the early portion of the series, the reader will be able to think electrically, and a tangle of wire under a car or a tangle of lines on a wiring diagram will become clear.

The first element in the thorough understanding of electrical apparatus is the idea of the circuit. At the conclusion of this series, "Electrical Equipment of the Motor Car," with additions, will be published in book form by the Class Journal Co., Chicago, in a size to fit the pocket conveniently.

WHAT HAS GONE BEFORE

In preceding installments of this series which appears weekly, beginning in the issue of *Motor Age* for June 29, the principle of the electric circuit was brought out. The circuit is the basis of the many applications of electricity to the motor car, and, in order to understand the operation and maintenance of these applications, it is essential that we have a thorough knowledge of the electrical circuit and its more common characteristics. In developing the idea of the electrical circuit its analogy to water systems is used. In electrical installations the circuit must be complete for a current of electricity to flow, and the path of the current is without beginning or end like a circle is without beginning or end. The relations of current, pressure and resistance in simple series and parallel circuits are developed.

Part III—Parallel Circuits

IF a water circuit is composed of two pipes and they are connected in the manner indicated at A and B in Fig. 22, they are said to be connected in parallel or multiple. There are two paths in which the water may flow in passing along the circuit from the point A to the point B and just as much water is returning to the pump in a given time as to leaving it. The quantities of water passing through the different pipes in a given time or the currents of water in the different pipes connected in parallel are not necessarily equal unless the resistances of the different pipes are the same. The water is not used up in the operation of such a circuit.

An electrical circuit composed of two or more different wires of perhaps different sizes, lengths and material, and connected as shown in Fig. 23, is called a multiple or parallel circuit. In this case there are as many paths for the electricity to flow through in passing from the positive terminal to the negative terminal, through the circuits outside the battery, as there are different wires in parallel. Just as much electricity is returning to the

battery in a given time as is leaving the battery. The quantities of electricity passing through the different paths in one second or the currents in the different paths of the parallel circuits are not necessarily equal unless the resistance of the different paths is the same. Just remember that the electricity is not used up in the operation of such a circuit.

A parallel water circuit it is found in the operation of the cooling system of a motor car engine, as shown in Fig. 24. In this case, the water jackets of the four cylinders are all connected in parallel and the pump forces the water through the water jackets and radiator. The current of water through the pump and radiator is the same and equal to the combined currents through the four water jackets. The currents in the different water jackets are not necessarily equal unless the opposition offered to the flow of water through the different jackets to the same in each case. It is obvious that, if the water jacket of one cylinder offers a greater opposition to the flow of the water than the other water jackets, there will be

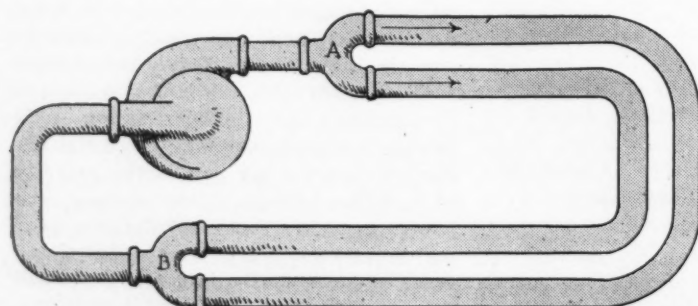


Fig. 22—A parallel water circuit

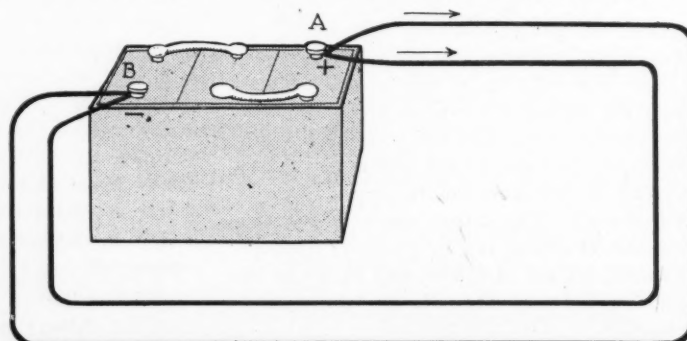


Fig. 23—A parallel electric circuit

a smaller current through this jacket than through the others. The water jacket offering the greatest opposition to the flow of water will have the smallest current; while the water jacket offering the smallest opposition always will have the largest current. The current in the remaining paths will have a value somewhere between the above maximum and minimum values.

When the headlights on a motor car are connected as shown in Fig. 25, they form a typical parallel electrical circuit. Just as much electricity returns to the battery in a given time as leaves the battery. The current in each of the lamps is not necessarily the same. Remember the electricity is not consumed in the lamps.

Resistance of Parallel Circuits

Since the resistance offered by a pipe to the free flow of water through it decreases with an increase in the size of the pipe the length remaining constant, it is evident that the resistance offered by two pipes connected in parallel will be less than the resistance of a single pipe. If the two pipes are of exactly the same size and length, they will, when connected in parallel, offer one-half of the resistance to the flow of water through the circuit that is offered by a single pipe.

For convenience, the two pipes, as shown in Fig. 26, might be considered as being equivalent to a single pipe, as shown in Fig. 27, whose length is the same as that of each of the two pipes and whose area is equal to the combined area of the two pipes, which will be twice that of either pipe, since the pipes are equal in area. The resistance of this large pipe, which is to replace the two smaller ones, will be one-half of that of either of the single small pipes since its area is equal to twice the area of either of the two small pipes.

Two wires of the same size and length and of the same material will, when connected in parallel, offer a resistance which is equal to the resistance of a wire of the same material and having the same length but having an area equal to twice the area of either wire. Thus the resistance of two wires of the same dimensions and material will offer, when connected in parallel, one-half of the resistance of either wire alone. Any number of electrical resistances connected in parallel might be thought of as being equivalent to a number of wires of the same length and material but having the same or different areas. Their combined resistance then will be equal to the resistance of a single wire of the same material and same length and whose area is equal to the sum of the areas of the several different wires.

For example, if two resistances of 6 and 3 ohms, respectively, be

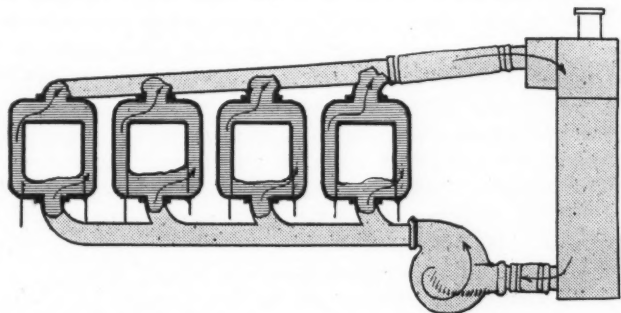


Fig. 24—Parallel water circuit in car's cooling system

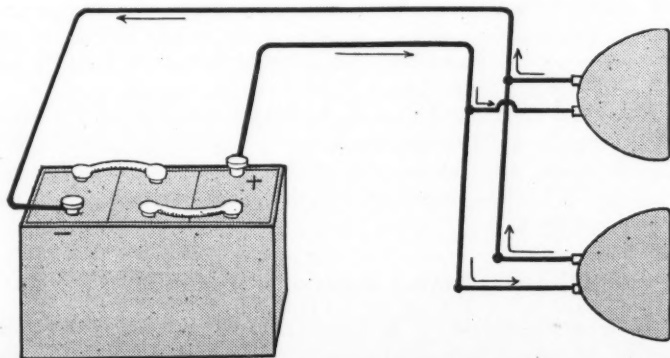
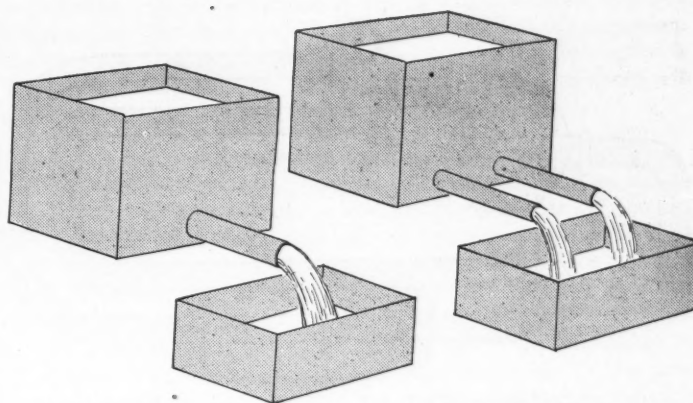


Fig. 25—Parallel electric circuit in lighting system



Figs. 26 and 27—The two pipes, at right, have the same resistance as one pipe, at left, if the combined areas of the two small pipes are equal to the area of the large pipe

connected in parallel, their combined resistance may be determined as follows:

For convenience, let us assume that these two resistances are two wires of the same material and that they are equal in length. Then, the area of the 3-ohm wire will be twice the area of the 6-ohm wire, since its resistance is one-half as great, the area increasing as the resistance decreases. The two wires will have a combined area equal to three times the area of the 6-ohm wire. The resistance of a wire whose area is three times that of another wire of the same material and having the same length will be one-third of the resistance of the smaller wire.

Hence, the resistance of a wire which may replace the two wires is equal to one-third the resistance of the 6-ohm wire, or 2 ohms.

Suppose three resistances of 4, 3 and 12 ohms, respectively, be connected in parallel. Their combined resistance may be determined as follows:

Again let us assume that these resistances are three wires of the same material and all have the same length, then the area of the 4-ohm wire will be three times as great as the area of the 12-ohm wire and the area of the 3-ohm wire will be four times as great as the area of the 12-ohm wire.

The three wires will have a combined area equal to $1 + 3 + 4$ or 8 times the area of the 12-ohm wire. This equivalent wire whose area is 8 times the area of the 12-ohm wire will have a resistance equal to one-eighth of the 12-ohm wire or $1\frac{1}{2}$ ohms.

Any number of resistances may be combined in the above manner by first assuming them all composed of the same material and having the same length and then replaced by a wire of the same material and same length, but having an area equal to the combined area of the several wires.

Conductance

The resistance of the electrical circuit is a property of the circuit which opposes the free flow of electricity through the circuit, and it is measured in a unit called the ohm. The property of the circuit which permits the electricity to flow, or that property which is just the opposite of resistance and is equal to 1 divided by the resistance in ohms, is called the conductance of the circuit and it is measured in a unit called the mho. It is interesting to note that the unit in which the conductance is measured is the unit of resistance, the ohm, spelled backward.

The resistance of a parallel circuit may be determined by merely adding the conductances of the several parts just as the resistance of a series circuit may be determined by adding the resistances of the different parts. For example, if two resistances of 6 and 3 ohms, respectively, are connected in parallel their resistance may be determined as follows: The conductance of the 6-ohm branch will be equal to 1 divided by 6, or $1/6$ mho, and the conductance of the 3-ohm branch will be equal to 1 divided by 3, or $1/3$ mho. The total conductance of the divided circuit will be equal to the sum of the conductances of the two branches, or

$$\text{total conductance} = 1/6 + 1/3 = 3/6 \text{ mho}$$

Since the conductance of a circuit is equal to 1 divided by the resistance then the above relation may be written as follows:

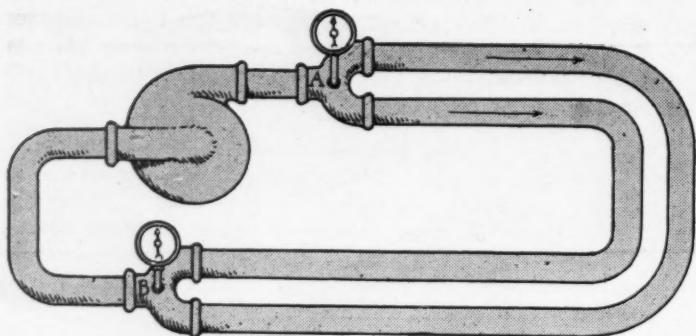


Fig. 29—The voltmeter across the ends of the branches in a parallel electric circuit shows the pressure in each branch, since the pressure is the same in each branch

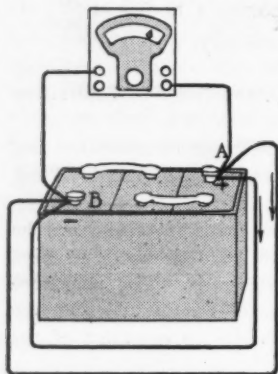


Fig. 28—The difference of the readings of the two pressure gauges at either end of the parallel water circuit represents the pressure on each pipe

$$\frac{1}{\text{resistance}} = \frac{3}{6}$$

or the resistance = $6/3 = 2$ ohms

Suppose three resistances of 6, 3 and 12 ohms, respectively, be connected in parallel, then their combined resistance may be determined as follows:

$$\begin{aligned} \text{total conductance} &= \frac{1}{6} + \frac{1}{3} + \frac{1}{12} \\ &= \frac{2}{12} + \frac{4}{12} + \frac{1}{12} \\ &= \frac{7}{12} \text{ mho} \end{aligned}$$

$$\text{Then } \frac{1}{\text{resistance}} = \frac{7}{12}$$

$$\text{or the resistance} = \frac{12}{7} = 1\frac{5}{7} \text{ ohms}$$

If two headlights whose resistance are 4 and 2 ohms respectively be connected in parallel, what will be the value of their combined resistance? The conductance of the two branches of the divided circuit formed by the two lamps will be one-fourth and one-half mho respectively, and the total conductance will be

$$\begin{aligned} \text{total conductance} &= \frac{1}{4} + \frac{1}{2} \\ &= \frac{1}{4} + \frac{2}{4} \\ &= \frac{3}{4} \text{ mho} \end{aligned}$$

$$\text{then } \frac{1}{\text{resistance}} = \frac{3}{4}$$

$$\text{or, the resistance} = \frac{4}{3} = 1\frac{1}{3} \text{ ohms}$$

Therefore the two lamps will have a combined resistance of $1\frac{1}{3}$ ohms.

When any number of equal resistances are connected in parallel the total resistance is equal to the resistance of one of the resistances divided by the number of resistances connected in parallel. For example, if six 4-ohm lamps are connected in parallel the total resistance of the combination will be equal to 4 divided by 6, or $\frac{2}{3}$ ohm. Remember this method of determining the resistance of a parallel circuit holds true only when the value of the different resistances is the same.

If pressure gauges be connected to the water circuit at the points A and B as indicated in Fig. 28, the difference in the readings of the two gauges will represent the pressure acting on each of the pipes forming the parallel circuit. It is obvious, from an inspection of this figure, that the pressure acting on each of the branches of a parallel or divided circuit is at each instant exactly the same.

If a voltmeter be connected to the electrical circuit at the points A and B as indicated in Fig. 29, the pressure indicated by the voltmeter will represent the value of the pressure acting on the divided circuit, and, it is obvious that the pressure acting on each of the several branches of a parallel circuit at any instant is exactly the same, since each branch is connected between the same two points. If several lamps be connected in parallel, the pressure acting on each of the lamps will be the same regardless of their candle-power or voltage ratings.

Current Relations for the Parallel Circuit

If two pipes of the same size and same length be connected in parallel and the combination in turn connected to a pump, the current of water in each of the pipes will be the same since they each offer the same resistance and the same pressure is acting on each of them. If, however, one of the pipes be longer than the other, their size being the same; or if one pipe be smaller than the other, their lengths being the same, the current of water in the two pipes will not be the same. The current of water in the pipes which offers the greater resistance will be less than the current of water in the pipe which offers the less resistance. For example, if the resistance of one pipe is twice as great as the resistance of the other pipe, then the current in it will be one-half as great as the current in the other pipe.

If two equal electrical resistances be connected in parallel they will each carry the same current. For example, if two 12-volt headlights of the same make and same candlepower be connected in parallel to a 12-volt battery, the current in each of the lamps will be practically the same. The total current supplied by the battery will be equal to the sum of the currents in the two branches. If, however, two resistances which are unequal in value be connected in parallel the current in the resistances will not be the same.

The branch of the divided circuit having the larger resistance will carry the smaller current, while the branch of the divided circuit having the smaller resistance will carry the larger current. The total current supplied to the divided circuit will be equal to the sum of the currents in the two branches regardless of whether these are equal or not. Thus if two 6-volt lamps which take currents of 3 and 2 amperes respectively be connected in parallel to the terminals of a 6-volt battery, the total current taken by the lamp will be equal to 3 plus 2 or 5 amperes.

From the above discussion it is obvious that lamps made to operate on different voltages can not be operated satisfactorily in parallel, because, if the voltage is adjusted to the proper value for one lamp, it is not correct for the other. In the case of the series circuit, the lamps had to take the same current in order to operate satisfactorily in series.

The relation of the currents in the two branches of a divided circuit is just the reverse of the relation between the resistances of the two branches. Thus, if the resistances of the two branches of a divided circuit are 4 and 8 ohms, respectively, then the current in the 4-ohm branch will be twice as great as the current in the 8-ohms since the resistance of the 4-ohm branch is one-half the resistance of the 8-ohm branch.

The total current supplied to a parallel circuit of any number of branches is equal to the sum of the currents in all of the different branches, and the relation of the currents in the different branches is just the reverse of the relation of the resistance of the different branches.

Examples Illustrating Relations of Parallel Circuits

If three resistances of 6, 3 and 2 ohms respectively are connected in parallel the relation of the currents in the different branches will be as follows: The current in the 2-ohm resistance

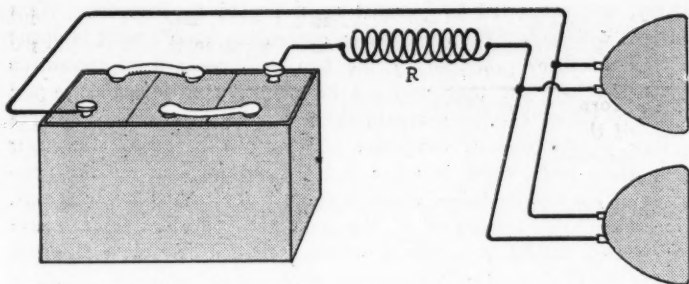


Fig. 30—A combined series and parallel lighting circuit, in which the lamps are in parallel and a resistance coil in series with the battery

will be equal to three times the current in the 6-ohm resistance and one and one-half times the current in the 3-ohm resistance. The current in the 3-ohm resistance will be equal to twice the current in the 6-ohm resistance and two-thirds of the current in the 2-ohm resistance. The current in the 6-ohm coil will be equal to one-half of the current in the 3-ohm coil and one-third of the current in the 2-ohm coil.

The resistance of the winding of an electric heater which is made to operate on a 12-volt battery is 3 ohms. What will the resistance of this heater be if a second winding of 6 ohms is connected in parallel with the first winding and what current will the heater take from a 12-volt battery after the second winding is put in place?

The combined conductance of the two windings is equal to

$$\frac{1}{3} + \frac{1}{6} = \frac{2}{6} + \frac{1}{6} = \frac{3}{6} \text{ mho}$$

then the resistance will be equal to 6 divided by 3, or 2 ohms.

The current taken by the 6-ohm winding will be equal to 12 divided by 6 or 2 amperes, and the current taken by the 3-ohm winding will be equal to 12 divided by 3 or 4 amperes. The total current taken by the heater after the second winding is put in place, will be equal to the sum of the currents taken by the two windings, that is 2 + 4 or 6 amperes.

The total current can be obtained by dividing the pressure acting on the heater by the combined resistance of the two windings, as follows:

$$I = \frac{12}{2} = 6 \text{ amperes}$$

Combined Series and Parallel Circuits

An electrical circuit may be a combination of one or more series and parallel circuits, as shown in Fig. 30, which represents two headlights in parallel with each other and this combination in turn connected in series with a resistance *R* and a storage battery. This is the principle used in some methods of dimming headlights. The sum of the currents through the two lamps is equal to the total current or the current in the resistance. The total resistance of this circuit is equal to the sum of the resistance of the parallel portion and the resistance of the remainder of the circuit. For example, if the resistance of the two lamps is 4 ohms each and the resistance of the coil in series is 3 ohms, the total resistance can be determined as follows:

Since the two lamps have equal resistances, their combined resistance will be equal to 4 divided by 2 or 2 ohms, and the total resistance will be equal to 2 plus 3 or 5 ohms.

If the voltage of the battery is 6 volts, the current in the circuit will be equal to 6 divided by 5 or 1.2 amperes. The value of the current in each of the lamps will be the same, since the two paths of the divided circuit have the same resistance, or one-half of 1.2, or .6 ampere. The pressure over the two lamps in parallel will be the same part of the total pressure as the resistance of the two lamps in parallel is a part of the total resistance. The resistance of the two lamps in parallel is 2 ohms and the total resistance is 5 ohms. Hence, the pressure over the lamps will be equal to $\frac{2}{5}$ of 6 or 2.4 volts.

The pressure over the 3-ohm resistance will be equal to $\frac{3}{5}$ of 6

or 3.6 volts. Or, if the drop over one part of the circuit is known the drop over the other part will be equal to the total pressure minus the drop over the first part. Thus the drop over the two lamps in parallel is 2.4 volts. Then, the drop over the 3-ohm resistance will be equal to 6 minus 2.4 or 3.6 volts.

Pressures in Parallel

If two pumps be connected, as shown in Fig. 31, they are said to be connected in parallel and the sum of the currents of water through the two pumps will be equal to the total current in the main pipes and water motor *M*, provided the currents in the two pumps are both in the same direction, that is, say from the point *A* to the point *B*, as indicated.

Let us assume that the valve *V* in the main circuit is closed so that there is no current through the water motor *M*. If the pressures produced by the two pumps are exactly equal and in the same direction with respect to the junction points *A* and *B* in Fig. 31, there will be no current through either pump because the two pressures are equal and neutralize each other. If, however, the pressure produced by one pump is less than that produced by the other pump, the two pressures no longer neutralized and there will be a current produced through both pumps by an effective pressure which will be equal to the difference in the pressures produced by the respective pumps.

For example, suppose the pressure produced by the upper pump is less than the pressure produced by the lower pump, then there will be an effective pressure acting around the circuit composed of the two pumps and their connecting pipes in the direction of the arrows through *P2*.

The current in the upper pump will be in a direction through that pump opposite to the direction of the pressure the pump itself is producing; while in the lower pump the direction of the current will be the same as the direction of the pressure that pump is producing. The current will be in the same direction as the arrows through *P1* if the pressure produced by the upper pump is greater than the pressure produced by the lower pump.

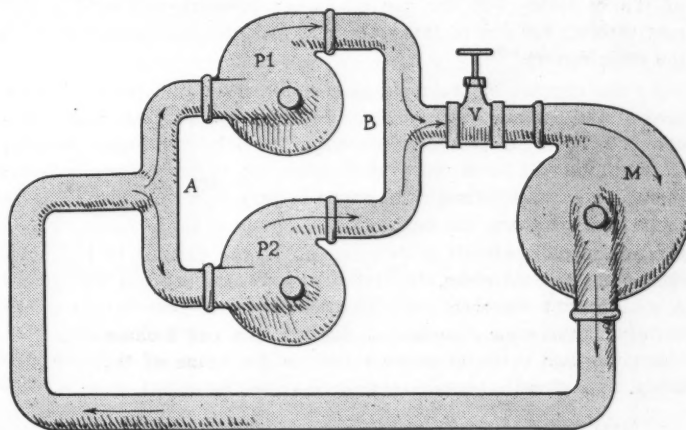


Fig. 31—Water pressures in parallel. Two pumps, *P1* and *P2*, supply one motor *M*

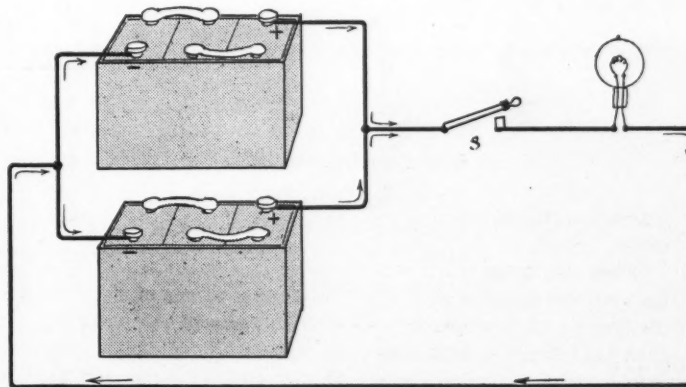


Fig. 32—Electrical pressures in parallel. Two batteries supply one lamp

The pressure between the two points A and B will be equal to the pressure produced by either or both pumps, provided there is no current in either or both of the pumps. When there is a current through either or both of the pumps and if this current is in the same direction as the pressure produced by the pump, the pressure between the terminals of the pump or between the points A and B will be equal to the total pressure produced by the pump less the pressure required to force the water through the circuit between the points A and B or to overcome the internal resistance of the pump.

If the current through the pump is in the opposite direction to the pressure produced by the pump, the pressure between the terminals of the pump or between the points A and B will be equal to the total pressure produced by the pump plus the pressure required to force the water through the circuit between the point A and the point B or to overcome the internal resistance of the pump.

It is obvious from the above discussion that the operation of two pumps having different internal resistances and producing different pressures would not be very satisfactory.

Two batteries are shown connected in parallel in Fig 32 and arranged to supply current to a 6-volt lamp. When the electrical pressure produced by the two batteries is the same and the two positives are connected together and the two negatives together, there will be no current through either of them when the switch S in the main circuit is open. If, however, the pressure produced by one battery is greater than that produced by the other, then there will be a current through both batteries when the outside circuit is open.

Suppose, for example, the pressure produced by the lower battery is greater than the pressure produced by the upper battery. Then, there will be a current through the upper battery in a direction opposite to its own pressure, even though there be no current in the main circuit. If the value of the current in the main circuit be increased gradually there will be a decrease in the terminal pressure of the batteries, but the one of higher pressure will send a current through the one of lower pressure and also the current through the main circuit.

As the current in the main circuit increases, the terminal pressure of the batteries will continue to decrease and finally this pressure will be equal to the pressure produced by the upper battery. Then, there will be no current through the upper battery. While there is a current through the upper battery in a direction opposite to its own pressure, the battery is doing more harm than good, so far as the main circuit is concerned. If the current in the main circuit further increases, the terminal pressure between the points A and B will decrease and there will be a current in the upper battery in the same direction as the pressure of that battery.

Suppose two batteries whose pressures are 6.5 and 7 volts, respectively, and whose internal resistances are .01 and .015 ohm, respec-

tively, are connected in parallel as indicated in Fig. 33. What current will there be in each battery, when the main circuit is open?

The pressures produced by the two batteries are in opposition to each other, but they will not be neutralized, as they are not equal in value, and, as a result, there will be an effective pressure acting in the circuit, composed of the two batteries and their connecting leads, equal in value to the difference between the pressures of the two batteries, which is equal to 7.0 minus 6.5 or .5 volt. Neglecting the resistance of the connecting leads, this effective pressure is acting in a circuit whose combined resistance is equal to the sum of internal resistances of the two batteries, which is .010 plus .015 or .025 ohm. There will be a current produced whose value is equal to the effective voltage divided by the resistance, or

$$\text{current} = .5 \div .025 = 20 \text{ amperes.}$$

Hence, the 7-volt battery will charge the 6.5-volt battery at a 20-ampere rate, when there is no current in the main circuit.

The current in the 6.5-volt battery will be zero when the terminal voltage of the 7-volt battery is 6.5 volts. In order that the terminal voltage of the 7-volt battery be 6.5 volts, .5 volt must be used within the battery itself in overcoming the internal resistance of the battery. This .5 volt pressure will produce a current whose value is equal to this pressure divided by the internal resistance of the battery, or

$$\text{current} = .5 \div .015 = 33\frac{1}{3} \text{ amperes.}$$

Hence, the current in the 6.5-volt battery will be zero when the current in the main circuit is $33\frac{1}{3}$ amperes. The 6.5-volt battery will be charging from the 7-volt battery for all values of current in the main circuit up to $33\frac{1}{3}$ amperes. When the current in the main circuit exceeds $33\frac{1}{3}$ amperes, both batteries act together to produce a current in the main circuit, but the value of the current through them is not the same.

If the pressures produced by two batteries connected in parallel are equal but their internal resistances are unequal, they will not each carry the same value of current, but the one of lower internal resistance always will carry the larger part of the total current. The reason for this is that the terminal voltages of the two batteries always are equal when the two batteries are connected in parallel, and, in order that this be the case when there is a current through them and their total pressures are equal, it is necessary that the battery of lower internal resistance carry a larger current than the one of higher internal resistance so that their internal drops will be equal.

The above relations readily account for the fact that two batteries will not always operate satisfactorily in parallel as it is really necessary that they have the same internal resistances and produce the same pressures in order that they divide the total current equally for all values of the current they may have to supply. The same thing is true of dry cells.

Next Week—Part IV of this series explains how we make electricity do work such as lighting lamps, cranking the motor, etc.

Read Each Installment

If you miss one chapter you will lose the trend of the Electrical Equipment serial. A week by week study of these articles will acquaint a novice with the intricacies of the electrical systems of his car and every owner can become his own capable repairman. Each chapter paves the way in the simplest terms, made understandable by comparisons of mechanical principles in every-day life, for the more technical chapters to follow and the full benefit of the series can only be obtained by a comprehensive reading of each chapter.

Toll of War on Motor Vehicles Decidedly Heavy

French Find More than 30 Per Cent of Their Cars Are Disabled at All Times



How French ambulance looked after a wall had fallen on it

PARIS, June 10—More than 30 per cent of the touring cars employed on military work are always under repair, according to a statement made by the military governor of Paris. This percentage, which is considerably higher than in any civilian service, is accounted for by the strenuous nature of military service, unnecessarily hard driving, and lack of attention. As a remedy the authorities have ordered that all drivers shall be allowed a minimum of half a day each week thoroughly to clean, examine and execute minor repairs to their cars. In addition, officers must insist on cars being washed every day and allow time for this work. It is forbidden for cars to operate away from macadamized or paved roads. When officers have to reach posts situated across country, they must go by car to the limit of the made roads and complete the journey on foot. The average speed on made roads must be kept down to 18 miles an hour. It is difficult to believe that this speed restriction will be observed on long trips over made and uncongested roads. At suitable intervals all cars must be sent to the workshop to be examined and put in order. This must be done even if no other car is available as a replacement. It is better that the officers should be without a car for half a day rather than allow defects to accumulate until the vehicle is irreparable.

When cars are on detached service the officers using them are given a service book, on presentation of which at any army depot they are able to get supplies and repairs. This book constitutes a

insurance companies have been victims. record of all work done on the car and enables cases of neglect to be traced to the responsible party. Officers on isolated service having the use of an automobile are under an obligation to keep the captain of the group to which the car belongs constantly informed as to the place in which it is garaged, thus allowing him to inspect it at intervals. This will prevent any officer using a car until it is ruined and then returning it.

TRUCKS FOR RADIO SERVICE

Washington, D. C., July 10—An interesting report, dealing, among other things, with the employment of motor transportation in connection with radio-telegraph apparatus and field line construction, has been made to the War Department by Capt. Chas. deF. Chandler, of the signal corps, who is the signal officer of the punitive expedition in Mexico under com-

mand of Brig. Gen. Pershing. It is pointed out in the report that animal-drawn vehicles in these times and under the conditions prevailing in Mexico constitute a backward step and place the signal corps, which has charge of communication, at a decided disadvantage.

For this reason favor is manifested toward equipping the first provisional company of the signal corps, which recently was organized, with motor transportation in the form of eight 3-ton motor trucks, two 1½-ton trucks and seven motorcycles with side cars. By means of these motor-driven vehicles the signal corps company will be able to provide communication, radio and wire combined, between a base and the headquarters, moving at the rate of 20 miles a day until such base and headquarters are separated by at least 200 miles.

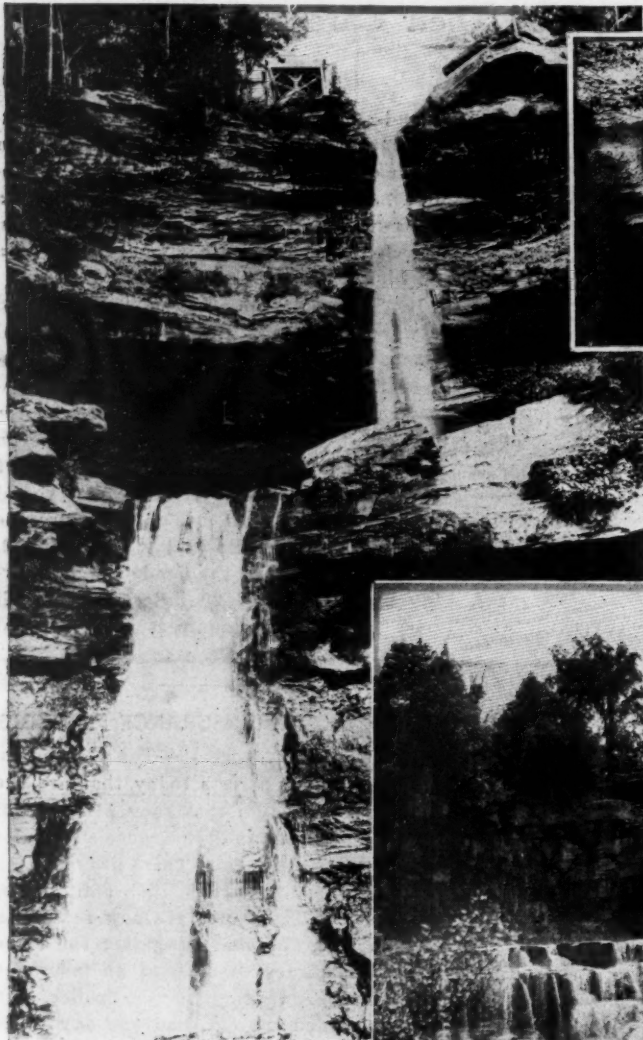
CHARGE CAR INSURANCE SWINDLE

Boston, Mass., July 10—The Boston police made some arrests today that are the first in a campaign that they believe will reveal plots to defraud insurance companies on alleged stolen cars. There are two men under arrest, Clarence G. Lieb and Samuel D. Averill. The police are now seeking a woman also, the charge against the three being conspiracy to defraud an insurance company. According to the police, the woman owned the car, and one day while she was dining with the two men it was suggested that one of them take the car and sell it and that the woman would make a claim against the insurance company for theft. One of the men took the machine and went to New Bedford where he sold the machine. Then the woman made a claim for the insurance. The insurance company put a man on the case and the car was discovered in New Bedford. Little by little the investigation disclosed who sold it and where it came from. Then the insurance company acted. Other theft cases are being investigated to see if the



Towing home a car wrecked by shell fire

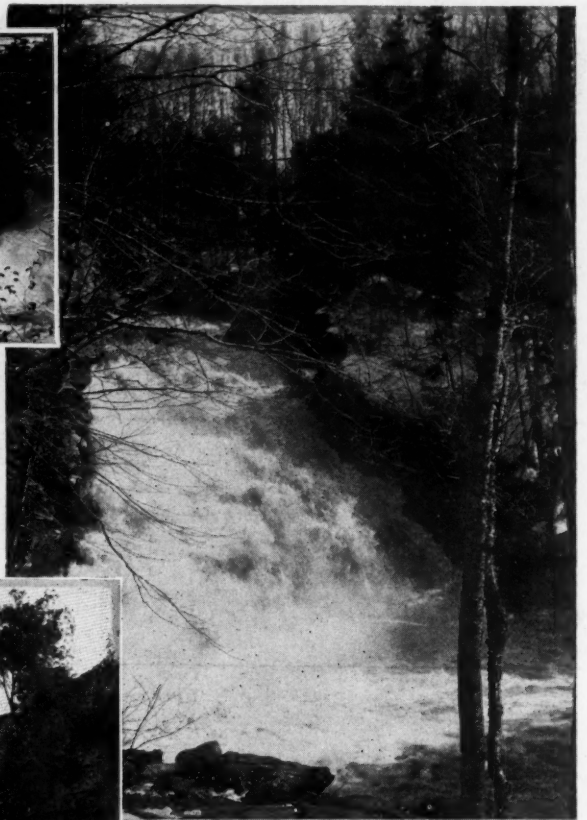
Magnificent American Water Falls East of the Mississippi



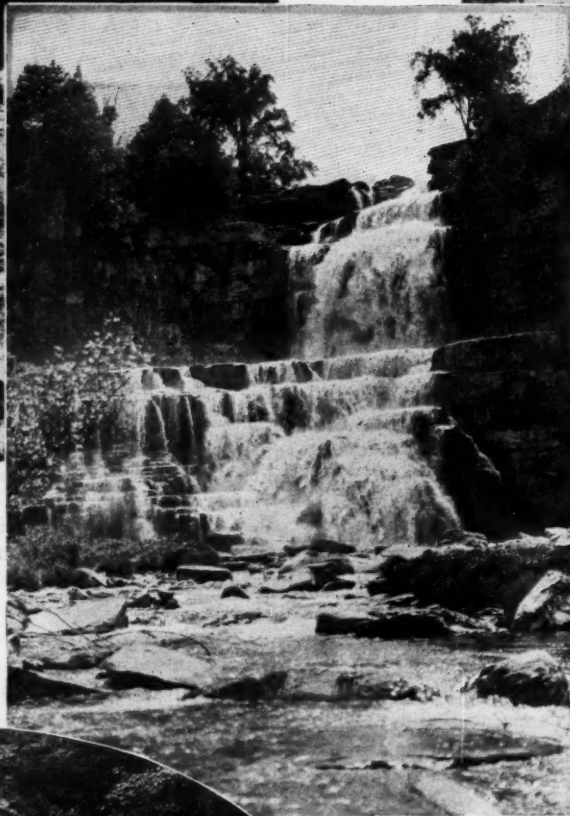
Catskill Falls in the section of New York around which the legend of Rip Van Winkle centers



Trenton Falls may be seen from the State road near Utica, N. Y.



National Falls, in the heart of the Berkshires, are among the most beautiful in the eastern states



The Chittengo Falls, near Cazenovia, N. Y., stumble over rock ledges of solid granite patched with growths of moss



The Lana Cascade in the Vermont Mountains courses an irregular path between huge boulders



Cataract in the Clove is in the Catskill mountains of New York state

All of Which Are Easily Available to the Motor Tourist



Above—The falls of the Potomac river visible from the old National Pike from Chesapeake Bay to Baltimore. Left—Bridal Veil Falls near Mont Eagle, Tenn., slides over steps of granite rock



Above—Minnehaha Falls, named after the Indian princess of Longfellow's Hiawatha, is located on a drive a short distance from Minneapolis. Left—American Falls, a short distance from Superior, Wis.



The marvelous Niagara is a source of never-ceasing wonder to the tourist. It is a symbol of death and new life, being both a rendezvous for the suicide and a stopping place for the honeymoon couple. Niagara is America's greatest waterfall

Car Exports Increase

Nations at War Continue to Absorb Quantities of American Vehicles

South American Shipments Climb Surprisingly Each Month

WASHINGTON, D. C., July 8—Interesting facts and figures are disclosed in the compilation of statistics of exports of motor cars during May last and the 11 months ended May, 1916, with comparative figures for the corresponding periods of last year. The statistics were prepared by the Department of Commerce and show, among other things, that during May last 1,717 commercial cars, valued at \$4,357,238; 6,275 passenger cars, valued at \$4,069,690, and parts, not including engines and tires, were exported to various countries. During the 11 months ended May last the exports were as follows: Commercial cars, 19,849, valued at \$53,254,400; passenger cars, 51,326, valued at \$38,340,066; parts, not including engines and tires, \$20,649,739.

Turning to the figures for the same periods of last year we find that in May a year ago 2,426 commercial cars, valued at \$6,583,912, together with 4,821 passenger cars, valued at \$3,971,483, and parts, not including engines and tires to the value of \$789,829, were shipped abroad. For the 11 months' period the exports were 11,006 commercial cars, valued at \$30,561,880; 19,462 passenger cars, valued at \$16,327,955, and parts, not including engines and tires to the value of \$6,714,001.

Bulk of Shipments to Europe

As has been the case ever since the European war began the bulk of our motor car shipments continue to find their way into Europe. A total of 877 cars, valued at \$1,764,489 were exported to France in May last, as against 521 cars, valued at \$1,106,572 shipped there in May a year ago.

The United Kingdom's contribution to American motor car manufacturers in May last was the purchase of 975 machines, valued at \$1,745,415, a considerable falling off as compared to the purchases in May a year ago, which amounted to 4,036 cars, valued at \$5,895,856. However, this decline was nothing as compared with the big increase in the purchases for the 11 months' period, which, in 1916, totaled 17,795 machines, valued at \$24,705,017, as against 11,688 cars, valued at \$16,736,185, exported in 1915.

Russia, which did not figure in the export tables last year, bought 359 cars, valued at \$660,620 in May last, and that country's purchases of American cars during the 11 months' period of this year amounted to 5,133 cars, valued at \$15,528,974.

Denmark is another country whose motor car imports from this country were not separately reported last year, but in May last we shipped there 210 machines, valued at \$144,737.

There were no motor car shipments to Germany during any of the periods under consideration, but Italy took 51 cars valued at \$19,376, in May last, and 307 cars, valued at \$192,107 during the 11 months of this year. Twenty-three cars, valued at \$17,004, were exported there in May a year ago, while during the 11 months' period the number was 111 and the value \$75,372.

There was a big drop in our export of cars to "other Europe," the shipments declining from 699 cars, valued at \$1,638,709, in May, 1915, to 404 cars, valued at \$392,189, in May last, and from 2,817 cars, valued at \$7768,101, during the 11 months of last year to 2149 cars, valued at \$2,651,331 during the same period of this year.

Even war-ridden Mexico shows a healthy growth in its imports of motor cars from this country, 58 cars, valued at \$53,500, being shipped there in May last, as against 3 cars, valued at \$4,407, exported in May a year ago, while during the 11 months' period the exports increased from 67 cars, valued at \$68,067, in 1915, to 396 cars, valued at \$381,818, in 1916.

Other section of the world that is showing a fondness for American cars is the West Indies and Bermuda, which took 495 cars, valued at \$296,798 in May last, and 4,355 cars, valued at \$2,642,466, during the 11 months of this year. Last year the shipments there amounted to 262 cars, valued at \$131,779, during May, and 1,383 cars, valued at \$827,989, during the 11 months.

Under the heading "South American countries," we shipped 165 cars, valued at \$88,631 in May a year ago, while during the 11 months of 1915 the exports there amounted to 1,071 cars, valued at \$583,119. This year the shipments have increased to such an extent that the various countries of South America are listed separately in the export tables and the figures are as follows: Argentina, 578 cars, valued at \$279,736 in May and 4,075 cars, valued at \$1,910,679 during the 11 months of 1916; Brazil, 32 cars, valued at \$14,944, and 236 cars, valued at \$142,191; Chile, 69 cars, valued at \$62,736, and 773 cars, valued at \$527,291; Venezuela, 16 cars, valued at \$12,025, and 432 cars, valued at \$276,495; other South America, 94 cars, valued at \$63,355.

ARMLEDER TRUCK PRICES

Cincinnati, O., July 10—After July 15 the prices on Armleder motor trucks, made by the O. Armleder Co., this city, will be as follows: Model HC, 2-ton chain drive chassis, \$2,200; model EC, 2½-ton chain drive chassis, \$2,350; model HW, 2-ton worm drive chassis, \$2,400, and model KW, 3½-ton worm drive chassis, \$3,250.

\$3,500,000 for Trucks

Government Quartermaster General Places Huge Order for Army Use

Nine Types of Vehicles, Mostly 3- and 5-Ton Capacity

WASHINGTON, D. C., July 11—Nine types of vehicles are included in the motor truck order placed by the quartermaster general of the army during the past week—an order amounting to almost \$3,500,000. Most of these 9 types are of 3-ton capacity, although 2 types are of 5-ton capacity. In the purchase of these trucks the war department has been largely governed by the recommendation of Gen. Frederick Funston, who has learned, through his subordinate officers, of the real needs of the army along motor truck lines, particularly the needs of the present service. Government officials here also are giving some consideration to the type of vehicles purchased better to regulate the models.

Keep Parts Stock Low

By this means it will be possible, officers say, to eliminate the purchase of too many types, which would require the keeping of manifold parts and greatly add to the repair problem. It is entirely out of the question, experts declare, to adopt a single standard type, owing to the refusal of motor truck manufacturers to depart from their own distinctive designs, which are of commercial value. The order recently given was divided as follows:

Ninety-seven Locomobiles, with bodies, 3-ton capacity; 2 Locomobile tank trucks; 8 Locomobiles, with platform bodies, 3-ton capacity; 224 Peerless, with bodies, 3-ton; 73 Peerless chassis, 3-ton; 2 Peerless, platform bodies, 5-ton; 12 Peerless, platform bodies, 3-ton; 6 Reos, with bodies, ¾-ton; 264 Packards, with bodies, 1½-ton; 132 Packards, 3-ton; 528 Whites, with bodies, 1½-ton; 33 Whites, with bodies, 3-ton; 99 Four-Wheel-Drive chassis, 3-ton; 58 Kelly-Springfield, with bodies, 1½-ton; 66 Kelly-Springfield, with bodies, 3½-ton; 99 Kelly-Springfield chassis, 3-ton; 33 Velie chassis, 1½-ton; 33 Velie chassis, 3-ton; 163 Packard chassis, 1½-ton; 33 Packard chassis, 3-ton.

JUDGE WANTS COURT SERENITY

Wilmington, Del., July 10—Judge Philip Q. Churchman, who presides over the Municipal Court, has declared war on all motorists who make unnecessary noise while passing the side of the new Public Building in which the court room is located, while his tribunal is in session.

The new building, which has just been occupied, having been built at a cost of about \$2,000,000, covers the block bounded by Tenth, Eleventh, King and French streets. Tenth and Eleventh streets are

steep hills and corrugated paving block have been used thereon. The Municipal Court room is on the Tenth street side of the building and the rough pavement is a noise producer, except as to rubber-tired vehicles. Motor cars ascending find it a help to open the cutout, while horses are also noisy. To insure quiet during the court sessions all noisy vehicles have been ordered not to use that street, while the cutout and loud horns are taboo.

MILBURN BROUGHAM UP \$100

Toledo, O., July 8—The Milburn Wagon Co., manufacturer of the Milburn electric, announces an increase of \$100 in the price of the model 22 Brougham, which formerly sold at \$1,585 and which after July 15 will be listed at \$1,685. An increase in the cost of materials entering into the construction of the car is given as the reason for the increase.

CARS FOR MAIL COLLECTION

Chicago, July 11—One hundred and ten more horses were forever relegated as obsolete in government service, when, on July 1, an equal number of Ford delivery cars were put in use by the Chicago post-office to take care of mail collection from boxes in the outlying districts of the city. With this latest addition in motor equipment the local office has but a very few straggling horse carts left, and these are used only for short hauls.

INDICT CHICAGO CAR THIEVES

Chicago, July 11—Indictments were returned yesterday by the July grand jury of Cook County against fifteen persons alleged to have been involved in the systematic stealing and selling of Chicago motor cars. These arrests are the result of clever work on the part of local police in unrooting a car stealing gang, which virtually constituted a trust, so great has been its scope of activity. All of the indictments were joint ones, there being as many as eight counts against several of those accused.

MICHIGAN PIKE TOUR

Chicago, July 11—Piloted by Grand Marshal John I. Gibson, secretary of the Western Michigan Development Bureau, members of the West Michigan Pike Association and affiliated organizations, left this city yesterday in more than twenty-five cars bound for the Straits of Mackinac. The trip is to last a week and will embrace prominent points along the eastern coast of Lake Michigan.

The city of Mackinac is the northern extremity of the Dixie highway and next Friday a monument will be unveiled marking the "Apex of the Dixie Highway." Members of the tour will take part in the unveiling ceremonies. The northern trip is scheduled for a 15-mile an hour average, with no scheduled return, as many participants desire to spend several days in the summer resorts of northern Michigan.

Government Gas Quiz

House Committee Favors Bill Permitting Federal Investigation

New Measure Will Give Public Insight on Present Situation

WASHINGTON, D. C., July 10—Another step in the fight being waged to find out the reasons for the rapid rise in the price of gasoline was taken today when the committee on mines of the House of Representatives reported favorably the Carter bill providing for the collection of information upon which Congress may base legislation to meet the constant advance in the price of gasoline. The bill, which was introduced some weeks ago by Representative Carter, of Oklahoma, authorizes the Secretary of the Interior to collect and publish all possible statistics and data relating to the production and marketing of petroleum products. These statistics and data shall embrace specifically the number of wells drilled, total amount of products and any other information of benefit and value to oil production, all of which shall be for the general information and use of the public. The bill carries an appropriation of \$20,000 to defray the expenses of the investigation during the present fiscal year.

Working for Bill

Chairman Foster, of the mines committee, declared that an earnest effort would be made to secure the passage of the Carter bill before Congress adjourned. "This is the first step possible in the direction of controlling the ever-increasing price of gasoline," said Chairman Foster. "The committee in its effort to take some action that would get to the root of the trouble in gasoline prices has encountered at every step the lack of adequate definite information as to the methods of production and manufacture. No agency of the government at the present time has authority to gather this information.

"The oil industry is the only great in-

terstate business in the country which is not in some way under the eye of the federal government. There is absolutely no accurate information as to how the business is conducted. Therefore no intelligent legislation can be framed to meet the evils in the industry. The evils cannot even be diagnosed. This bill will provide the means for securing the necessary information."

1897 HAYNES WINS CONTEST

Kokomo, Ind., July 10—In all probability the Haynes "Light Twelve" car, offered for the oldest Haynes car that is running in America at the present time, will be awarded to Walter E. Smith, Bound Brook, New Jersey, who has an old two-cylinder car that was built in 1897. The car is in operation today, and this spring won a prize as the oldest car in a county contest. Its nearest competitor was a 1902 two-cylinder car.

The machine retains its original appearance almost in entirety. Even the rubber matting which was furnished with the car is still intact, and the original warning system, a bell operated by a foot lever, is used by Mr. Smith today. Throughout its tenure, the old car has received the best attention, and has never been in any sort of an accident. It weighs 1,950 pounds and originally cost \$1,900. It is a surrey that provides ample room for four passengers, and is steered by a lever. The car today makes from 15 to 20 miles an hour over good roads.

Compared to the high-speed, multiple-cylinder motors of the present day the old two-cylinder engine presents a vivid contrast. Each cylinder has a carbureter and dry battery of its own. The engine has a 5-inch bore and a 6½-inch stroke, and is rated at 15 horsepower.

The Bound Brook car was built shortly after the Haynes company began building two-cylinder models in 1897. With the exception of three one-cylinder cars that Elwood Haynes built himself and have since been lost trace of, this car stands, according to present records, as the patriarch of the old Haynes cars in America.

A Great Highway in the Northwest

(Concluded from Page 7)

road to Yellowstone park, the distance is 184 miles and the country is very interesting. Further details of what to see and the different park trips will be given in a later issue.

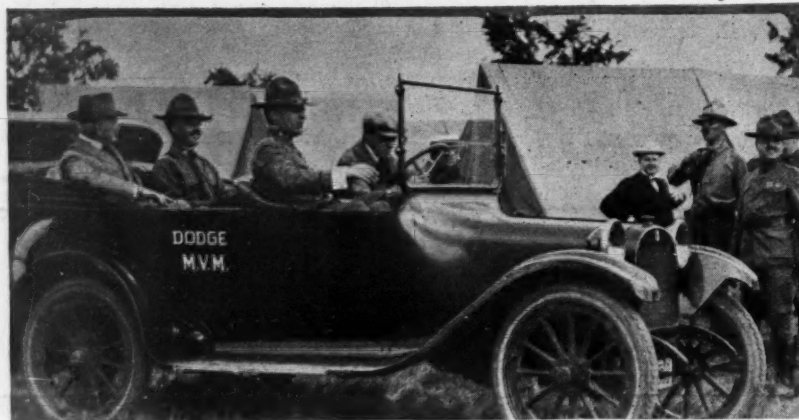
The country to the west of the park is so replete with scenic wonders that it would require much space to tell of each 100-mile section, space which is not available at this time. I do not need to tell of the Rockies to interest you—everyone who has heard or can lip the word would like to see them and those who have seen them want to do so again. If you are going west the Yellowstone trail trip is

one that leads through one of America's Wonderlands.

And now as to the road conditions. From Chicago to Fond du Lac, Wis., the road is all good and improved. From Fond du Lac to Eau Claire there is some construction work going, but most of the way is all improved and none of the way will much difficulty be found. Local inquiry should be made at Fond du Lac and Wau-paca. From Eau Claire to Minneapolis there is some sandy road when the weather is exceedingly dry, but just at present this causes no inconvenience. This is being graveled now.

Driving Trucks Through Mexico Anything but Joy-Ride

Operators Must Continue Work or Else Be Sent to the Calaboose



Left to right, seated in car: Governor McCall, of Massachusetts, Brigadier General Sweetser, Adjutant General Cole, reviewing troops and directing entrainment



Type of armored cars used by the troops at the front in Mexico

COLUMBUS, N. M., July 8—Life as a motor truck driver between the army base here and the front in Mexico is anything but a joy ride. There's a vast difference between handling a light truck with a two-wheel steer on the paved streets of Chicago, San Antonio, New York or other cities and handling a 2-ton heavy truck, with four-wheel control, over the loose sands of the Mexican deserts.

Offers of \$100 a month "and found" drew many chauffeurs away from the cities. Youthful chauffeurs believed that romance and adventure awaited them with the Pershing expedition. But one trip over the desert brought disillusionment. Blistered palms and tired backs told of the strain in holding the big trucks to the trails. But the biggest howl was over the lack of variety in the line of eatables. For awhile, it was beans for breakfast, beans for lunch and beans for the evening meal. Beans are enjoyable, for a change, but not for a steady diet.

It has been the custom to allow a truck train 2 or 3 days in the base camp between trips. But when a train got in, empty, on Monday morning, orders were issued for a quick overhauling and a start back over the desert late in the afternoon.

Food Not Favored

And then there was a howl! No more flapjacks for breakfast! No more good old roast beef for dinner! Visions of beans, beans, beans rose before the eyes of the indignant civilian chauffeurs. They decided to call a strike!

But Uncle Sam has rather energetic methods of handling a strike. There were no negotiations. Major Sample, in charge of the base, wanted to know whether the drivers were going to be on the job in the afternoon. No? Well, then, off to the calaboose!

There is a grave situation facing the troops in Mexico and speed in getting the food supplies to Pershing's base is important. Field rations by the thousand are being rushed south. For that reason, Major Sample was not inclined to argue matters with the strikers. They saw the force of his contention and, late in the day, they agreed to make the forced trips and the strike was broken.

WRECKING TRUCKS FOR MEXICO

Kenosha, Wis., July 8—A power winch, with 300 feet of steel wire cable and two capstan heads, is the feature of a new type of wrecking truck that will aid the get into difficulties. Several of these are now on their way south and others are being turned out by the Thomas B. Jeffery Co., Kenosha, Wis., as fast as possible in anticipation of the rainy season in Mexico. The chassis is the Jeffery quad.

The body of this truck is made of steel. It is 10 feet long, 40 inches wide and 32 inches deep, and has wide running boards on both sides, strong enough to hold a con-

MAKING AMBULANCE BODIES

Columbus, O., July 10—Construction of motor ambulances is the latest addition to the factory of the Excelsior Seat Co., the first vehicle turned out by the firm having been placed in the service of the Second Ambulance company now at the mobilization camp. Several months ago this company, which for years has been making buggy seats and buggy bodies, considerable outside load. Besides the power winch and capstan heads, the truck carries 300 feet of 9/16-inch wire cable, 100 feet of 1 1/4-inch manila rope, an oxy-acetylene welding outfit complete with acetylene and oxygen tanks, flux rods and wire.



When a halt is called for lunch on the road, the trucks are so parked that they form a square. This forms an entrenchment for the troops in case of a surprise attack from the Mexicans

stalled new machinery and began the manufacture of motor car bodies.

The unusual demand for ambulances resulted in the designers of the company preparing plans for a light field ambulance, which were approved by the medical officers of the Ohio national guard. The construction of a simple vehicle was undertaken and the result was so satisfactory that the company has been ordered to go ahead with the proposition, being advised that there will be pressing need for that type of ambulance before long. A regulation Ford chassis was rebuilt so that it had a wheel base of 130 inches. The body follows the accepted ambulance lines.

FACTORIES FURNISH VOLUNTEERS

Detroit, Mich., July 8—This city is being hard hit by the United States government's call to arms to handle the Mexican situation. With more than 1,000 of her young men in the mobilization camp of the state national guard, the city has been called on to recruit another 636 men for service with the motor transport division of the army along the southern boundary.

With a long-distance telephone order for 396 motor trucks received recently by the Packard Motor Car Co., came the request for the additional recruits. "We need experienced motor vehicle mechanics," said the voice of the quartermaster-general over the wire. "Send along truckmasters, assistant truckmasters, drivers, mechanics and cooks."

The Packard company had already furnished 122 men for government service with the army. Packard employees manned the 122 trucks shipped to the border since March 22, which are now carrying supplies to Gen. Pershing's men in the interior of the southern republic and along the border. The company also lost 109 employees when the call came for national guard mobilization, and another contingent will soon board ship on the call for



Unloading the food for the 4.7-inch guns at El Paso

the state naval militia. Trucks and men will be sent to the south on special trains provided by the government.

U. S. VEHICLES ARE ECONOMICAL

Washington, D. C., July 10—A statement has been issued by the Post Office Department in which it is set forth that instead of procuring rented equipment on a contract basis the government during the last 2 years has inaugurated the system of purchasing and operating its own motor vehicles in the delivery, collection and transportation of the mails in cities. There are at present in the service a total of 411 government-owned motor cars, which cost in excess of \$500,000, and the expense of operating this number of cars, including drivers, garages, supplies, repairs, etc., is approximately \$640,000 per annum, which is less than the amount expended under the contract system for the service taken over.

It is further stated that if future experience shows that this branch of the service proves to be as satisfactory and economical it will rapidly develop into a great and important project, involving the expenditure of millions of dollars annually and requiring highly intelligent supervision and a large amount of routine clerical work in its installation and operation, as rented vehicles are gradually replaced by those owned by the department.

CHURCH STUDIES ARMY TRUCKS

Detroit, Mich., July 10—H. D. Church, chief engineer of the truck division for the Packard Motor Car Co., has returned from a 3-weeks' tour of inspection of government motor transport facilities along the Mexican border. The purpose of the visit was to cooperate with army officials in obtaining the best results from the service of Packard trucks.

Mr. Church made the 65-mile trip from Marfa, Tex., to Presidio, on the international boundary, with a Packard truck train and reports encountering the worst roads he ever saw. He also visited the great army concentration camps at Fort Bliss, San Antonio, and Columbus, N. M.



One of the many armored trucks that are now stationed along the border

TAXIS EXCLUDED FROM DEPOT

Kansas City, Mo., July 10—The controversy which resulted in the exclusion of jitneys from the street in front of the Union Station has gone further. It has resulted in removing the Shaw taxicabs from the side of the street next to the station also. This came following application for an injunction against the taxicab company in the Federal court. Taxi drivers were arrested for violating an ordinance against soliciting business adjoining the station, but the judge said he had no jurisdiction, putting the matter up to the federal court.

Motor Camping *in the* Rockies

By W.A. Lippman



Daughter indulges in a morning scrub

Tips to the Tenderfoot Tourist

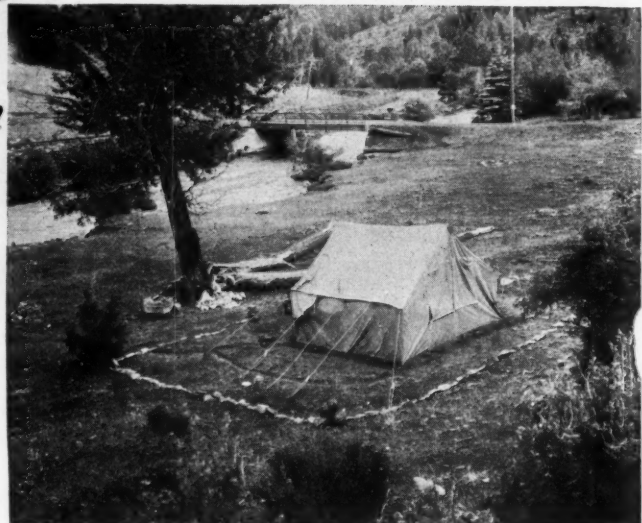
In Two Parts—Part II

WHEN you drive over Colorado mountain roads remember always that the motor is beholden to take the outside of the road when meeting horse-drawn vehicles—that rule holds good in most mountain communities and in Colorado it is a law—the theory is that a frightened horse might very easily spill his load over a bank when passing to the right, whereas that danger is eliminated if the horse always has the right to the inside or away from the danger zone. The roads up the Thompson canyon are well equipped with turn-out places and it requires only ordinary care and vigilance to guard against accidents. There are state laws controlling the rights of drivers of these turnout places—it is well to read the signs and remember what they say when you get into one of the narrow defiles where there is room for only one car—keep tooting your horn until you are out of it and then keep on tooting your horn for the fellow who may be just ahead of you in another place like it. We found it a great convenience to have an extra horn button on the side of the car opposite the driver as warnings could be sounded without the driver removing his hands from the wheel.

Take Time in Passing

If you meet another car or a horse drawn vehicle, take your time and decide which one of you is to back to a wider place. If it is a horse or team, don't debate the question, but back to where the driver can pass you. A wagon is not certain in its backing—a motor car can be very certain. Remember that it is really much easier to back up hill than it is down, because going up, if you wish to stop you always have the gravity load to help you—the clutch thrown out quickly and a hurried grip of the brakes and you can set your car in a jiffy, but going down hill, it is difficult. Usually the easiest way to back down a mountain

road is to go into neutral gear and let your car coast backwards — braking alternately with hand and foot brake or in reverse gear with your engine off. Never let your car travel faster than a very slow walk when you back on a mountain road and you can back as safely as you would on your own driveway at home. The grade will furnish all the



Camping in the Platte Canyon. The stone fence kept the children busy and out of mischief

power you need in the majority of cases.

This brings me to the subject of brakes. Until I toured in the mountains I never dreamed what an important life-saving factor brakes were. As careful with my brakes at home as the average careful driver and with a touring experience of three summers, I found that mountain driving called for a closer watch of the brake adjustments than anything I had known. When I realized its importance I never let a morning find us on the road starting for a day's ride, or even an hour's jaunt, until I had examined and tried the brakes and their connections, then a close examination of the toggle-links at the wheels to see that clevis pins and split pins were in place and secure. This little precaution took only a minute and always cleared my mind of anxiety if I felt any at all.

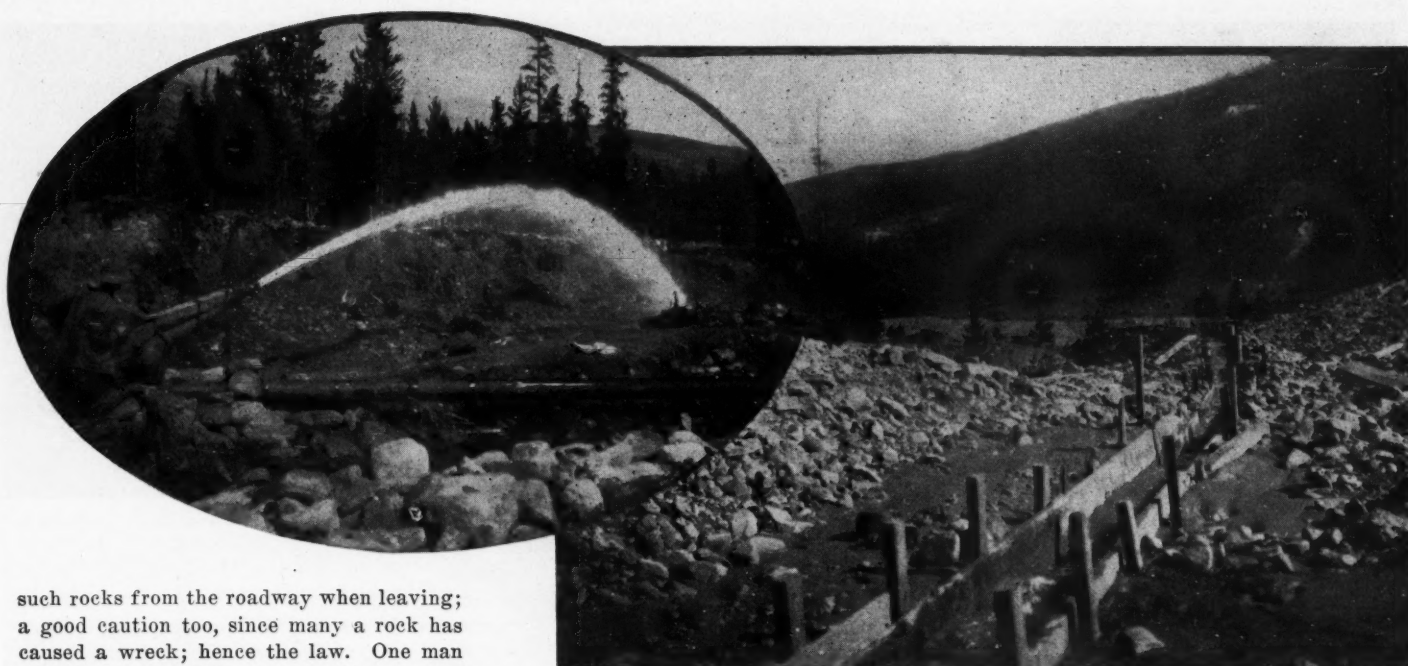
Precautions Necessary

Our car is a dependable car, one that responds to the work of the mountains remarkably, but such precautions are an absolute necessity in the mountains. I may add that not once did I have occasion to repair any brake connections nor to make any adjustments except to tighten the bands a little as the Raybestos lining which wore away.

Emergency measures are numerous for breakages and many will occur to the practical mind—for instance, the old practice of propping a rock behind your wheels to aid your brakes or to give them a respite—if you do this you are specifically adjured by the state signs to remove



A roadway that hangs on the mountain side like a balcony—a marvelously constructed convict road



Hydraulic mining. Sluice boxes riffles in the bottom catching the gold as it sinks

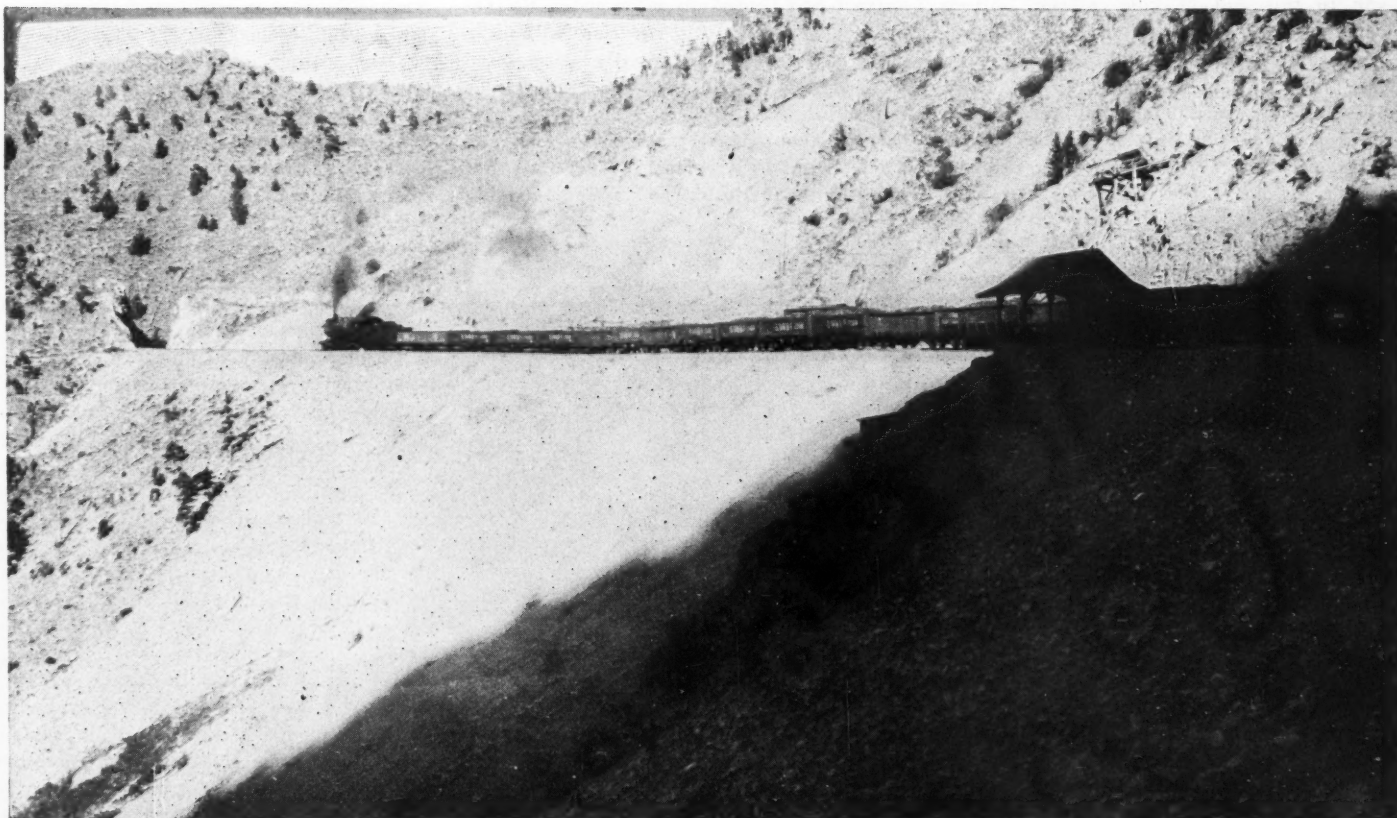
such rocks from the roadway when leaving; a good caution too, since many a rock has caused a wreck; hence the law. One man told me that he had broken the driving shaft in his car just before he started down the long grade of Lookout mountain. The customary practice of coasting with the car in gear and the spark off, so often used, was therefore denied to him—he had paid little attention to his brakes before going into the mountains and could not trust to them to coast him safely down the long grade. With that adaptability born of necessity, he tied a pine tree to the rearsprings of his car and with this as a drag came safely into a friendly village where brake linings could be applied and where he could wait for the receipt of a

new driving shaft. You may not find a tree in a similar emergency; you may have come from home without a sturdy axe; then there are always flat rocks, as large and heavy as you want, and, while not as good or secure as a tree, nor possessed of as dependable dragging value, they are yet worth the trial.

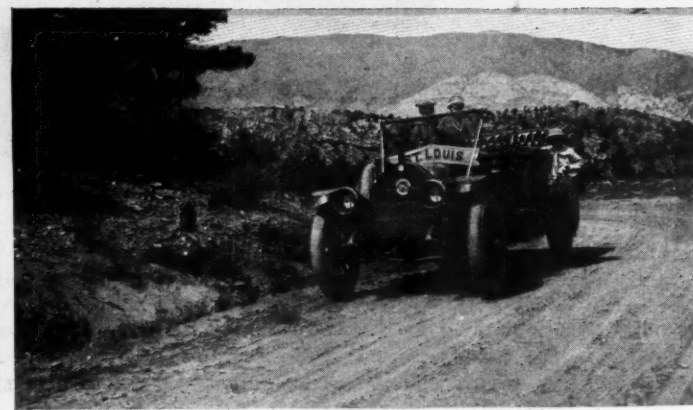
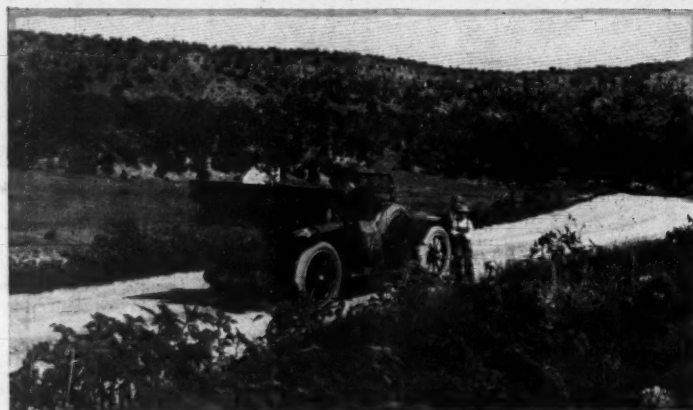
Through Thompson Canyon

If you are looking for more than the average slice of real sport, if you hanker after something a little harder than the

front porch variety of exercise, then take this drive through Thompson canyon, over as perfect roadway as you will find anywhere. When you enter the broad hay fields which announce your arrival at Estes Park proper, do not follow the Estes Park trail, which would quickly take you to the modern down east Stanley Hotel. Turn away from that tempting road and follow the trail that heads for Mill's Moraine, a small natural park that lies a few miles up into the heart of the mountains.



When the sun sinks behind the mountains it leaves a long shadow in its wake



Upper left—Once impassable, this point blasted out of solid rock, is the hardest climb on the way to the Royal Gorge view. Low-gear signs erected here testify to the pull ahead. Two cars have made the pull on second-gear, none on high; the road is 3 years old. Lower left—With roads like this, amid Rocky Mountain vistas, touring is a delight. Upper right—This road is as smooth as asphalt, and as good in wet weather. Hundreds of miles of such roads in Colorado. Lower right—One of the fine views in the Colorado Rockies

A good but winding road quickly brings you to this end of your journey. Here you will run your car under a parking shed that is large enough to hold many cars and, if you are lucky to get there near dinner time, you will feast upon chicken dinner fit for any taste. Enos Mills, forester, writer, naturalist, student, ranger, friend of the beavers, has built a splendid lodge in this beauty spot. To Enos Mills more than to any other man or number of men, must be given credit for the creation by the United States Government of the No. 14 Rocky Mountain National Park with its thousands of square miles of wild scenic beauty preserved forever to the enjoyment of the American people. This stopping place is 9,000 feet above sea-level and some 1,500 feet above the Estes Park level. Spend the night at the hotel and get an early morning start afoot on the way towards Long's Peak. Long's Peak, while 14,271 feet in height, is the twelfth peak on Colorado's list of high mountains. There are twenty-seven peaks in Colorado higher than Pike's Peak.

A Hard Climb

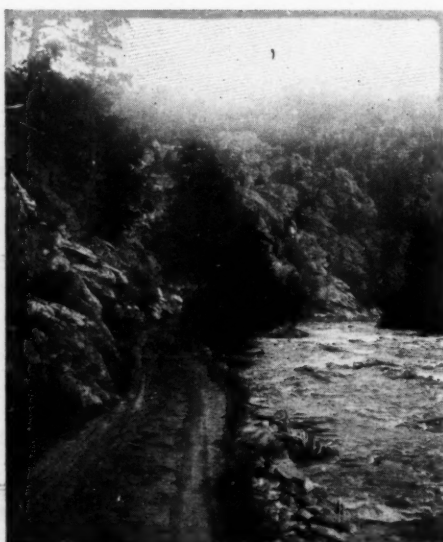
Long's Peak is credited with being the seventh hardest climb in America and, while a hardy experienced mountain climber can, with ease, make the trip from the Inn to the summit and return in a

long day from sunrise to sunset, the tenderfoot had better not attempt it. Neither is it wise to attempt the trip without a guide, and one may usually be secured from Mr. Mills. An easy way to make the trip is to walk the first morning to Timberline, about 11,000 feet above sea-level, where, right on the trail, a very cozy but rough built shelter will be found—lodging

and splendid meals may be had here quite reasonably and an early start from here—say 4 or 5 o'clock in the morning—will get the walker quite comfortably to the top and return to Timberline before night-fall.

Hint to Mountain-Climber

The walk is not a sinecure—by no means should it be undertaken by a weak-hearted person, or one who is nervous, for the climb after crossing the boulder field—a vast area of topsy-turvy rocks, several miles wide and considerably longer—is along the edge of a slanting ridge where, at times, a misstep would mean a fall over a cliff which seems miles down and is in reality over a thousand feet. For several hours, going up, the climber actually clings with all fours to the face of the rocks, catching at footholds and handholds as best he may. The danger element is always present, especially if there be wind and driving rain or sleet, as there so often is, but with all the risk assumed, there is only one record of a serious result from this climb and that was attributable to heart disease and not to falling or slipping. The view from any step along the climb is most beautiful and seldom equalled even in this land of mountain scenery, and as the top is approached, with its cleft peak, the real majesty and awesomeness holds one in a never-to-be-for-



For 23 miles this perfect granite road winds through Thompson Canon, in Estes Park

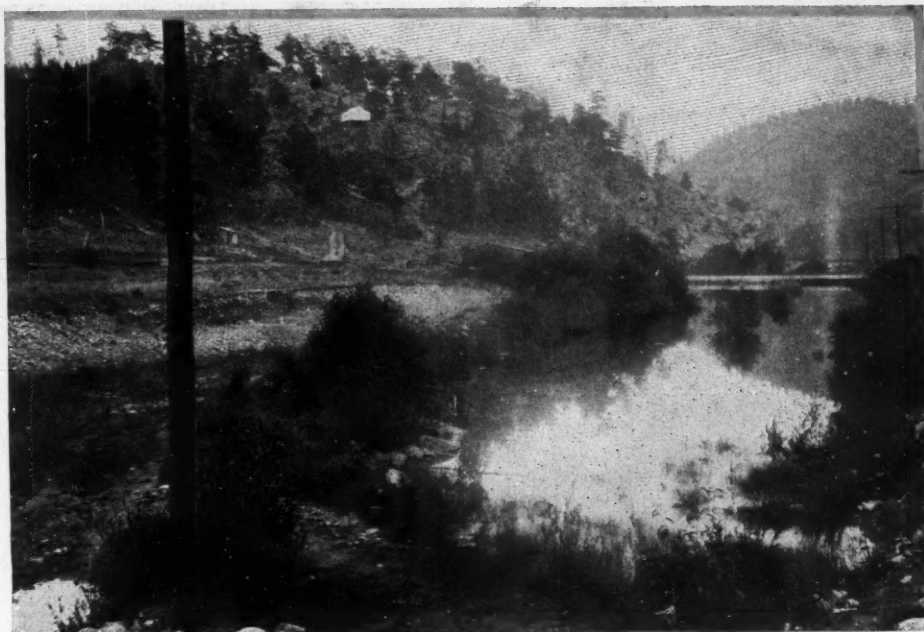
gotten grasp. The split in this monster stone is the most gigantic break in the Rocky mountains and at one point the rock face extends downward for a distance of over 2,600 feet—the deepest straight faced crevice known.

The trail at the top is marked with cairns of rocks placed there by government engineers and rangers, and no doubt many have been placed there by Mr. Mills and certain it is that the piles of rocks have grown annually as climbers added to them in passing. The climb is one not made by many and is well worth the time and effort it requires. The return to the Inn from the cabin at Timberline is easily made in 2 hours and so, with only 2 days time, the motorist may take a side trip that will live in memory as one of the greatest experiences of his life.

To drive back to Estes Park, stopping at Stanley Hotel enroute—the Stanley of steamer car fame—through Estes Park village, on 4 miles farther to Moraine Park and on side trips to a dozen small settlements, each attractive in its quiet mountain atmosphere, always in view of snow-capped mountains—sometimes viewing as many as eight or nine at one sweep of the horizon—here in the heart of all this beauty, with thrills in plenty, one wonders how Americans feel the call of the European mountains so strongly; why travelers must pass by this great playground—the Alps of Italy and Switzerland could be very easily dropped into a section of the Rockies and scarcely disturb the horizon.

Many Beautiful Drives

Nowadays the tourist visiting in Colorado Springs or Manitou is apt to take in some of the various drives that have made those resorts the center of a network of roads, but there are, however, a class of runabouts who have the germ of unrest and who cannot remain quiet for long, even when vacationing. For such, whether in their own cars or hired machines, a dozen trips out of the Springs can be made on as many days; none of them very long and yet each taking the traveler into the heart of the Rockies,



Lakes with unmeasured depths are prevalent

into the land of the leaping trout streams and the eagles' nests.

Get an early morning start from the Springs on the way to Cañon City and the Royal Gorge. It is 49 miles from the Springs to Cañon City and it is a wonderful road most of the way. A few years ago this road was rough and impassable at times; now every foot of it is in perfect condition, barring a short stretch near Cañon City, which may have been repaired before this date. You will find on this road typical Colorado roadwork. Convict-made and well made, this highway stands as a tribute to the genius of Warden Tynan of Cañon City, and it surely must have made better men of the prisoners who worked on it. The honor system has an ardent supporter in Warden Tynan and his colleagues. The men who are sent out over Colorado to work on its highways cannot help being better men for the work they do under this system which takes them out into the open air, under the bright blue skies of Colorado high altitudes; under guards with duties

and watchfulness more like factory foremen in a well organized factory than prison guards.

Roads Convict-Built

So much has already been written about the honor system of convict road building followed in Colorado that it may be superfluous to dwell on it here, but it were well for the entire country to know what has been accomplished there and with what splendid results for men, officers and highways. The present road-making plans are even more comprehensive than at any time in the past and the state prisoners who engage in this work already have built up for their unfortunate selves monuments that will live for many years as memorials to their efforts and tributes to the trustfulness and human faith of one man—Warden Tynan.

As you wind along the bending road that leads from the Springs; as you spin happily over boulevard roads cut out of the sides of the hills, rock-banked for dizzy heights at places, here and there fording clear mountain streams on con-



A perfect convict-made road, on the Sky-line drive near Cañon City, Colo.



Such sights as this are rare even in this land of scenic wonders—snowcaps in August

crete floors built the width of the road, assuring your safety and passage, you cannot help admiring the work of the prison hands. You know that no manner or method could build better roads than these and you know that men could not do this work if they were manacled at wrist and shackled at ankle. This is not the work of slaves, but the labor of men, who see in their set tasks, unfettered or cowed by heavily-armed brutal drivers, a chance to forget the crime that sent them behind the bars—the slip that put them, for a time, beneath the heel of society.

On the Royal Gorge

Before you know it you have covered the distance to Cañon City and are ready for the trip to the top of the Royal Gorge and return by way of the Sky Line Drive—short trip that has no superior anywhere in this land, if, indeed, anywhere on earth. You have covered about 50 miles; you have traveled over some of the most fertile land in all the West; you have passed through some of the celebrated fruit lands of Colorado; you have witnessed some very amazing things that man has built, here in the lengthening shadows of the mountains; you have come into a pocket in the mountain ranges and as you continue your journey up on to the top of the peaks you will find that the Creator was in a serious mood when he slashed this gigantic cut through the heart of the rock.

Running up over the steepness of the Royal Gorge trail under the brightness of a mountain sky, never even thinking of cloud or rain we found ourselves in good time at the very brink of the gorge, standing on the very edge of eternity, with naught but a foot of rock between us and the bottom of the canyon a half mile below, the mind reeled for a moment or two, partly in contemplation of what

would happen should one lose balance and hurtle through that half mile of space to the rocks outlining the banks of the thread-like brook below, and partly in wonderment over the beauty of such a scene. Here in the heart of the Rockies, within 10 miles of a busy city; with a railroad at the bottom of the canyon, which, from our height, looked like a fine polished steel ribbon with a streak of darker metal through the center; here a silence and calm held forth such as one finds only in sublime heights. Even the puffing of a train, with two engines, passing through the canyon below, scarcely disturbed the silence more than a mere whisper.

We loitered here, loitered longer than we had intended, and before we lunched and were on our way, there gathered in

the near distance, in clouds that at first were fleecy and white, a storm. Nowhere in all the world can storms gather with such rapidity or with such fierceness as in the high mountains; the rare atmosphere is a natural playground for the charges of electricity that accumulate on high and which find their vent in the thinner strata of moving air which envelop the snow-capped peaks. Our storm, innocent enough at first, soon assumed alarming proportions and we scurried for shelter, if you could scurry in a 2-ton car, down a 10-mile road that for most of its distance obliges you to coast with spark off and engine in low or intermediate gear. There is little chance really to go fast if one felt so inclined. The road winds and dips and turns and back tracks; here and there horseshoe after horseshoe is described. No sooner do you leave one than you are on to another; first your car tilts to the left on the perfectly banked convict road and then it tilts the other way. You soon learn to respect, then to love the engineer who first had the vision of this mountain road. It takes men with something beside training to build such roads. It takes men with hearts, courageous and stout as well as brains that work with exact precision.

A Mountain Storm

We met our storm later that day, though not until we had felt our freedom and even dared to make the climb up the marvelous Sky Line Drive to the top of the hogback that hides Cañon City from the mountains that lie west of it. Here on the top of the ridge that appears to have been lifted up from the earth in some gigantic upheaval centuries ago the city of fruits and cantelopes has built a ribbon trail that is scarcely a half mile long, yet representing a tremendous road-building task. Here, a thousand feet or more above the city one finds a viewpoint un-



A granite road between mountains of shelf-rocks, Nature's gift to Colorado



Hundreds of spots like this tempt the fisher as well as the photo-artist

paralleled near any other mountain city. The fertile valleys, with their thousands of acres of orchards, lay out in myriad squares of colors, relieved here and there by patches of wheat, always in beautiful squares or rectangles as though made with a tri-square. To the other side one reluctantly turns, only to find it as fascinating, if indeed not more so. Here for a distance quickly measured by the eye as a mile or so, lie terraced gardens, banked in symmetrical flats, like cards heaped one above the other with edges overlapping. These gardens, maintained under the honor system by the convicts from the nearby penitentiary, contain every variety of color that would result from planting all the vegetables that flourish under the warming sun and the refreshing rains of Colorado's summers. Beyond the farms and beyond the low hills that lay farther on are the mountains, and on and on as far as the eye can see and as far as the imagination can carry always the mountains, some with their rugged and bare-faced rocks, a half mile high, without vestige or sign of tree or plant; others with snow-capped peaks and long dark yellow streaks that denote the glacial snows which, for hundreds of years, gather and pile up, melt down and regather, only to melt again but never to leave entirely.

With sighs of regret we left this beauty spot, hesitating only long enough to climb down the rocks for a glimpse of the forbidding prison walls below. It looks so near the rocks that one wonders why the men who live within those walls do not escape by way of the rocks; but a glance from below is enough—there is

no escape via these jagged, ugly rock cliffs. The man who would succeed in reaching the rocky boundaries of the prison that is built right against the cliffs would find these walls more impassable than any ever made by the hand of man.

A Storm Described

Out of this region of beauty and on to the short plains that lay stretched out before us on our way back into the mountain range as we re-tracked back to Colorado Springs, we rambled until we came into the threatening shadow of our storm again. There are few men gifted with the touch of pen adequately to describe a mountain storm and in the more modern literature we lose sight of W. H. H. Murray, a writer of the eighties, whose love for the mountains is so fitly woven into his *Adirondack Tales*: He describes a storm:

"The forces of the storm were now so far developed as to have fairly come into action. The earth and sky were alike electric, the air and ground thoroughly charged with the subtle fluids. The atmosphere was ready to ignite at every point and the explosions followed each

other in volleys. The lightning was incessant. It ran in fiery rivers down the declivities of the firmament, emptying itself in the far distance. It cut its fiery zig-zags hither and yon, so lurid and fiercely hot that the eyes ached as they beheld. It shot its bolts horizontally through the air, which exploded ever and anon like powerful rockets; the earth was tremulous. Its solidity was assaulted with such violence that the subterranean pillars trembled through all their mighty shafts and shook on their broad bases. The clouds, brought out by the lightning's blaze to plainest vision, were awful to look upon. The heaven was in tumult."

Into and through such a mountain battle of elements we raced, knowing not what else to do, nor where else to go, for we were well into the lonely fastness of the mountains again and no habitations near for shelter—there was nothing to do but go on. Amid all the tumult and crash, lightning and the raging of the wind, little rain had fallen—now and then a sprinkle—but we knew that somewhere out in the blackness of the vapory banks there was rain waiting to drench the earth and feed the mountain streams. We raced with every new approach of the tumult; we gauged our margin of distance and now saw it narrow to a line, then broaden out to what seemed to be a few hundred yards. We were sprinkled many times; we felt the cold sleet-like cut of the wind-driven rain from behind. So furiously and so fast did it chase us at times we felt like stopping in the shadow of some friendly rock and trying to escape its fury; at times we were impelled to push our motor to the very limit and dare the storm to catch us, and while we were yet debating as we fled before the hurricane, we felt it lessen in force and fierceness, now never letting up speed or slackening except for dangerous turns in the road, we continued our eastward race and won by a narrow margin; for 50 miles we had kept ahead of the wrath of the storm and the experience, while worth having gone through, was one not to be repeated by choice.

What a good time you could have touring if it did not rain! How often that plaint is heard! But there are many answers to it and not the least of these is that one may not escape the rain anywhere so why should it be allowed to interfere with the pleasure of touring? To be sure there are limits to what one may endure in the way of downpours and few tourists there are who can enjoy the drenching all-day rains that now and then, especially in the spring months, make life a burden. There is no need for rain fears to stop the tourist if he is



Seen at 11,000 feet elevation in the Rockies. Burnt over forests which cover thousands of acres

willing to put up with some inconvenience.

Up Ute pass we were caught in a down-pour that began about 4 o'clock in the afternoon and lasted pretty well all night. We had our tent set up for the night when the rain began, already having been warned that it was coming. Rains in the mountain regions, that is, genuine rains, are preceded by lightning and thunder and it is not often that rains catch you unprepared. We camped on the bank of the stream that follows Ute pass and during the few hours before sundown we found plenty to keep us busy in gathering dry firewood and trenching the tent—a precaution it is well never to overlook when rains threaten.

Building our fire between two tall pines and during the rains to drown us out, we had no difficulty in preparing a most delicious supper that was served in style inside the tent. Luckily that evening there was a fruit gardener passing on his way to Green Mountain Falls and we requisitioned from him cantelope, lettuce, tomatoes, corn, apricots and large luscious cherries. Perhaps the rain added a zest to the food; perhaps the fact that a brand new 10-cent store paper tablecloth was laid on the folding table within the tent; at any rate the supper was fit for the eating of an epicure and how good it did taste!

Refreshing Sleep

Within a stone's throw of us the trains labored and groaned as they climbed up the steep grade to the pass beyond, but so soundly does one sleep at the end of a touring day that none disturbed us. Noon found us well on our way; the rain had stopped and an hour or two of sunshine and the drying atmosphere of the mountains and nothing but an occasional pool gave any evidence of the drenching of the night.

Out of Denver, almost due southwest, not more than 70 miles away, there lies one of the most beautiful plateaus that is to be found anywhere in the Rocky Mountains—South Park—which is reached by a splendid road, though there are many heavy grades on this route. Any good car with moderate power, not overloaded, can make this trip to South Park and return, about 140 miles, easily. The charted road, as given in the Blue Book, carries you on to Buena Vista, from which point you may go northwest to Leadville or south to Salida, thence to Cañon City and on to the Springs.

For any one who wishes to loiter along for a few days to enjoy excellent trout fishing, to spend hour after hour kodaking, this route will appeal strongly, especially as there is an abundance of small resorts. In fact, after reaching the mountain country, 15 miles out of Denver, there will be found tiny hotels and summer cottages every few miles all the way to Grant—60 miles ahead. A much better road, particularly with regard to the scenic value, no doubt will be built some day up this

beautiful canyon. Rumors have it that enthusiasts have planned to use an old railroad grade up the canyon and build on this good foundation a road that will shorten the way into the canyon and once in it increase the opportunity for enjoying the beauty of the surrounding mountains.

Having arrived in the canyon of the South Platte river, entering at Baileys, 49 miles from Denver, the way becomes more picturesque and the hills steeper. There is one grade just a short distance from Baileys, where the gradometer showed 18 per cent, but that has been reduced by affecting a broad turn. This point is still the dismay of many a tourist. We camped just below the hill for 10 days and during that time we were greatly amused watching the cars attempt to take the grade on high. Few drivers enjoy dropping back into second or first gear on reaching climbs in the mountains, but after one has traveled enough on these rugged grades, going back into the lower speeds becomes as much a matter of course as going into first on starting. Motorists who are careless or conceited about the power of their cars get into lots of trouble in mountain climbing and this grade near Baileys is no exception. While we were there an average of ten cars per day came past our tent. Many of the drivers, knowing the hill, came to a full stop and started in first speed, remaining there until the hill was safely negotiated; others, not knowing the hard pull, would boldly and swiftly take the turn that leads up to the climb and by the time the turn was

made begin to show signs of trouble. We did not see a single car take that hill on high gear while we were there, though every sort of car came by us.

One man with his wife and two children came along in an old 1907 or 1908 car of medium power, carelessly drove it on third speed to the bend of the road, then, finding that he could not make it on third, dropped back into second and then broke his driving shaft. An attempt to help this party revealed the astonishing fact that he had neither tool-kit, jack, tire-pump, nor even a spare casing; oddly enough he had an extra tube or two, but they were both punctured. Asked what he did when troubled with flat tires, he said that "someone always came along." So does part of the world live. As a matter of fact, someone came along in this case. Help soon had him safely ensconced at Baileys and there he stayed until a mechanic from Denver came up with the new part and about 3 days after he broke down we saw them sailing by our camp once more headed up the steep hill, this time a little more cautiously, on their way up the heavy grades ahead to take the steep pass at Kenosha and thence to Buena Vista, Salida and home to Colorado Springs—a neat little run of 224 miles through some of the hardest mountain roads to be found anywhere in the Rocky Mountains.

We saw no more of them but the chances are nine out of ten they got through safely. Thus Providence takes care of those who refuse to care for themselves.

Answers to Inquiries for Road Information

Atlanta, Ga.—Chicago

ATLANTA, Ga.—Editor Motor Age—Kindly give the best route from Atlanta, Ga., to Chicago, Ill.—Geo. M. Ruddy.

In going from Atlanta, Ga., to Chicago, Ill., the best routing for you to follow is to go north through Cartersville and Rossville to Chattanooga. In dry weather you can go straight from Chattanooga to Nashville, but in wet weather you will find it better to go over to Huntsville, then north to Nashville.

From Nashville, drive through Springfield, Cave City, Elizabethtown, to Louisville, then through Salem, Seymour, Columbus, Franklin, Indianapolis, Lebanon, Frankfort, La Fayette, Wolcott, Remington, Goodland, Morocco, Thayer, and Dyer, to Chicago.

Volumes 6 and 4 of the Automobile Blue Book will give you the complete routing for this trip.

Shenandoah, Ia.—New Martinsville, W. Va.

Shenandoah, Ia.—Editor Motor Age—Kindly give the best route to Martinsville, W. Va., over good roads.

What volume of the Automobile Blue Book would cover this trip?—H. N. Richardson.

In going to New Martinsville, W. Va., we advise you to go south through Tarkio, Burlington Jct., Maryville, Savannah, St. Joseph, then going east through Cameron, Chilli-cothe, Wheeling, Brookfield, Bucklin, New Cambria, Macon, Clarence, Shelby, Monroe, Hannibal, Kinderhook, Maysville, Valley City, Jacksonville, Springfield, Decatur, Tuscola, Newman, Hume, Chrisman, Rockville, Danville, Indianapolis, Greenfield, Cambridge City, Richmond, Lewisburg, Englewood, Vandalia, Springfield, Alton, Columbus, New-

ark, Hebron, Zanesville, Cambridge, Hendrysbury, Morristown, St. Clairsville, Bridgeport, Wheeling, Limestone, Pleasant Valley, Cameron, Littleton, Anthen, New Martinsville.

You will find mostly dirt roads as far as the Illinois-Indiana state line, but from there on you will find macadam and gravel roads all the way, and you should not have any difficulty at all. The dirt roads over which you have been routed, however, are the best in the country, and in good weather you should have no difficulty at all in making your trip.

Volumes 5 and 4 of the Automobile Blue Book will give you the complete routing for this trip. These may be procured of the Automobile Blue Book Publishing Co., Mallers Bldg., Chicago, Ill.

Terre Haute, Ind.—Sioux Falls, S. D.

Owensboro, Ky.—Editor Motor Age—Kindly give the most desirable route from Terre Haute, Ind., to Sioux Falls, S. D.

I am at a loss to know which is the best route across Illinois, if it is best to go via Bloomington, Galesburg and Davenport, or via Joliet, Aurora and Clinton.—L. E. Spring.

In going from Terre Haute to Sioux Falls, S. D., you will find it best to go through Cayuga to Danville, then through Champaign, Farmer City, LeRoy, Bloomington, Mackinaw, Peoria, Brimfield, Galesburg, Monmouth, Burlington, Mt. Pleasant, Fairfield, Ottumwa, Oskaloosa, Pella, Monroe, Prairie City, Des Moines, Dalles Center, Minburn, Ogden, Jefferson, Carroll, Denison, Ute, Smithland, Holly Springs, Sioux City, Westfield, Akron, Hudson to Sioux Falls.

Volumes 4 and 5 of the Automobile Blue Book will give you the complete routing for this trip.

Oklahoma Circular Trip

Drumright, Okla.—Editor Motor Age—I am desirous of taking a vacation in the eastern and southeastern part of this state, via Tulsa, Mayes, Delaware, Cherokee, Adair, Sequoyah, LeFlore, McCurtain, Pushmataha, Choctaw, Atoka, Coal, Bryan, Johnston, Carter, Murray, Garvin, Pontotoc, Pottowatonne. Kindly give me a route.—Dr. M. Karasek.

The trip that you have outlined, I think you will find very enjoyable and over good roads practically all of the way, and we advise that you procure a Volume 1 of the Automobile Blue Book, which will give you a complete routing for this district. You can procure this of the Blue Book Publishing Co., Mallery Bldg., Chicago.

Fullerton, La.—Huntsville, Ala.

Fullerton, La.—Editor Motor Age—Kindly give the best route to Huntsville, Ala., and tell me where I may procure the Automobile Blue Book.—Mrs. P. H. Taylor.

In going to Huntsville, Ala., we advise your going up through Alexandria, Pineville, Nebo, Roton, Harrisonburg, Balina, Ferriday, Natchez, then through Roxi to Meadville, and through Eddiceton, Brookhaven, then go north through Wesson, Hazlehurst, Crystal Springs, and Terry, to Jackwon, where you turn east through Brandon, Fannin, Morton, Forest, Newton, Meridian, Cuba, York, Livingston, Demopolis, Uniontown, Safford, Selma, Prattville Montgomery, then north through Verbena, Jemison, Calera, Birmingham, Village Springs, Oneonta, Blountsville, Garden City, Falkville, to Decatur, and then to Huntsville.

Volume 6 of the Automobile Blue Book will give you the routing to Decatur and Huntsville. This may be procured from the Automobile Blue Book Publishing Co., Mallery Bldg., Chicago. Price \$2.50.

Corrects Route to Henderson, N. C.

Hartwell, Ga.—Editor Motor Age—In looking over the issue of June 15, I notice you advise a reader, in routing from Atlanta, Ga., to Henderson, N. C., and Asheville, to go via Spartanburg, Raleigh, etc.; you should have advised going from Greenville direct to Henderson, which is much nearer and better way than the towns named.—A. N. Alford.

Bartlesville, Okla.—Los Angeles, Cal.

Bartlesville, Okla.—Editor Motor Age—Kindly give the most direct route to Los Angeles, Cal., from Bartlesville, Okla. Which route do you advise, the Lincoln Highway or the Santa Fe trail.—Clyde Chambliss.

In going to Los Angeles, Cal., I think you will find your best routing by going up through Caney and Peru, then over to Arkansas City. From Arkansas City, go up through Winfield, Wichita, Hutchinson, then from here, along the Santa Fe trail through Kingsley, Dodge City, Garden City, Syracuse, Coolidge, Holly, Morse, Las Animas, La Junta, Thatcher, Trinidad, Raton, Springer, Wagon Mound, Las Vegas, Fulton, Santa Fe, Albuquerque, Becker, Socorro, Magdalena, Springerville, Holbrook, Winslow, Flagstaff, Grand Canyon, Williams, Seligman, Peach Springs, Kingman, Yucca, Needles, Fenner, Ludlow, Minneola, Barstow, San Bernardino and Pasadena, into Los Angeles.

There is no need of your going to the Lincoln Highway as this will take you several hundred miles out of your way.

Volume 5 of the Automobile Blue Book will give you complete routing for your trip. This can be procured from the Blue Book Publishing Co., Chicago.

Okeene, Okla.—Moberly, Mo.

Okeene, Okla.—Editor Motor Age—Kindly give the routing and distance between Okeene, Okla., and Moberly, Mo. Kindly

give the northern and also southern route out of Kansas City.—H. Buckingham.

On your trip to Moberly, Mo., we advise your going to Enid, then north through Pondcreek, Medford, Caldwell, Wellington, Wichita, to Newton, then from Newton go northeast through Florence, Emporia, Ottawa, Olathe, Kansas City, Independence, Levasy, Lexington, Grand Pass, Marshall, Glascow, Fayette, then north to Huntsville and Moberly.

Volume 5 of the Automobile Blue Book will give you the routing from Enid to Glascow.

The southern route out of Kansas City goes from Independence to Oak Grove, Odesa, Mayview, Blackburn, into Marshall, but it is not so good as the northern route as this has more gravel on it.

Jonesboro, Ark.—Springfield, Mo.

Lake City, Ark.—Editor Motor Age—I wish to go from Jonesboro, Ark., to Springfield, Mo. Kindly give the best route between these two cities, naming the towns through which we will pass. Is there a reasonably good road that follows close along the Frisco Railroad to Springfield, Mo.?

I noticed in Motor Age that a new road was expected to be completed this summer from Denver to the Messa Verde National Park and the Grand Canyon of Arizona. About when will this road be completed and is there now a motor road from Montrose, Colo., to the Messa Verde National Park? Does it extend on to the Grand Canyon?—P. J. Springer.

In going from Jonesboro, Ark., to Springfield, Mo., your best road is to go through Bono, Sedgwick, Walnut Ridge, Pocahontas, Dalton, Lilac, Thayer, Chapin, Brandsville, Westplains, Olden, Pamona, Willow Springs, Mountain Grove, Norwood, Mansfield, Hartsville, Odin, Marshfield, Northview, Strafford, into Springfield.

In going from Denver to the Messa Verde National Park, I think you will find it best to go down through Colorado Springs, Pueblo, Walsenburg, then go west through Alamosa, to Durango, and then from there to Messa Verde Park.

The road from Montrose to the Park is being worked on at the present time, but we have not heard definitely about the section from Ouray to Durango being opened yet for travel.

You probably can get from Messa Verde Park over to the Grand Canyon, but you will not find the road a very good one and it will be practically impossible to get across the Grand Canyon to the other side. We do not advise your attempting this at all.

Madras, Ore.—Jackson, Minn.

Madras, Ore.—Editor Motor Age—Kindly give the best route from Madras, Ore., to Jackson, Minn.—P. W. Ashley.

On your trip to Jackson, Minn., we advise that you go north through Shaniko, Wasco, Heppner, Pendleton, Walla Walla, Spokane, Wallace, Missoula, Drummond, Butte, Bozeman, Livingston, Billings, Miles City, Mar-marth, Lemmon, Moberly, Aberdeen, Ortonville, Olivia, then south to Redwood Falls, then into Jackson.

Vols. 8 and 5 of the Automobile Blue Book will give you complete routing for your trip.

One Day from Chicago

Chicago—Editor Motor Age—Kindly give the best one day trip out of Chicago. A trip on which something can be seen, where frequent stops can be made and not simply covering ground.—J. Glassman.

It is very hard to plan a trip out of Chicago over good roads as there is so much heavy travel in the immediate vicinities that nearly all the roads are very rough. It is very hard for a one-day trip to get out and see anything, as you say, and not be "just covering ground," but you will probably find, to get good roads, about the only thing to

do would be to go up the North Shore. You can go up through Evanston, Wilmette, Winnetka, Glencoe, Highland Park, Fort Sheridan, then cut over to the Green Bay Road up through Lake Forest, to Belvidere street, Waukegon, then go over to Gray's Lake, Bolo, McHenry, and back through Crystal Lake, Algonquin, Dundee, into Elgin, then from Elgin go through Ontarioville, Bloomington to Addison. From Addison go straight east over to Franklin Park and come into the city over Grand avenue.

You ought to be able to make this trip in a day, but between Elgin and Addison you will find the road rather rough, and I do not think you will be able to make any trip without getting some stretches of rough roads.

Columbus, O.—Washington, D. C.

LaSalle, Ill.—Editor Motor Age—Is the route from Columbus, O., to Wheeling, W. Va., Cumberland, Md., Hagerstown, Pa., and Washington, D. C., over hard roads such as the route from Pittsburgh, Pa., Bedford, Pa., to Gettysburg and Washington, D. C.?—L. B.

You will find the road from Columbus through Newark, Zanesville, Wheeling, Washington, Cumberland, Hagerstown, into Washington, D. C., to be a very good road. This was put into first class shape last fall for this year's travel. It is not only one of the best roads across the Allegheny Mountains, but also is a very scenic trip. You should encounter no difficulty at all in motoring through the Cumberland Gap. A good deal of this is tarvia road, and the rest is of very good macadam, with numerous stretches of brick.

South Bend, Ind.—Colorado Springs, Colo.

Wakarusa, Ind.—Editor Motor Age—Kindly give the best route from South Bend, Ind., to Colorado Springs, Colo.—H. S. Bechtel.

There are several good ways of going out to Colorado Springs, but probably the most satisfactory one would be to go through Valparaiso, Joliet, Ottawa, LaSalle, Princeton, Davenport, then follow the River-to-River and White Pole Way to Des Moines, and the White Pole Way to Omaha.

From Omaha, follow the O. L. D. to Lincoln, Hastings, McCook, Sterling, Fort Morgan, Greeley and Denver. Or you can follow the Lincoln Highway out through Fremont, Columbus, Grand Island, North Platte, Big Springs, Julesburg, down to Sterling, then into Denver.

Another route is by going from Davenport to Ottumwa, then over to St. Joseph, or from Davenport to Des Moines and down to St. Joseph, and follow the Pikes Peak Ocean-to-Ocean through Hiawatha, Belleville, Norton, Colby and Limon into Colorado Springs.

Any one of these routings is over good roads in dry weather, but of course, as they are all dirt, in wet weather you will have to stop until the roads are in a condition to be traveled over.

Volume 5 of the Automobile Blue Book will give you the routing from Chicago out to Colorado Springs.

Springfield, Ill.—Grand Forks, N. D.

Morrisonville, Ill.—Editor Motor Age—Please give the best route from Springfield, Ill., to Grand Forks, N. D.—A. L. Stocks.

In going to Grand Forks, you will find your best routing by going north through New Holland, Delavan, Dillon, Peoria, then through Brimfield to Galesburg and north through Alpha, New Windsor to Davenport. From Davenport go out to Iowa City, then north to Cedar Rapids, Waterloo, Charles City, Austin, Owatonna, St. Paul, Minneapolis, Anoka, Big Lake, St. Cloud, St. Joseph, Albany, Melrose, Alexandria, Fergus Falls, Barnesville, Moorhead, Fargo, then north to Grand Forks.

Volume 4 of the Automobile Blue Book will give you the routing to Galesburg, Volume 5 from Galesburg to Grand Forks.



The Readers' Clearing House

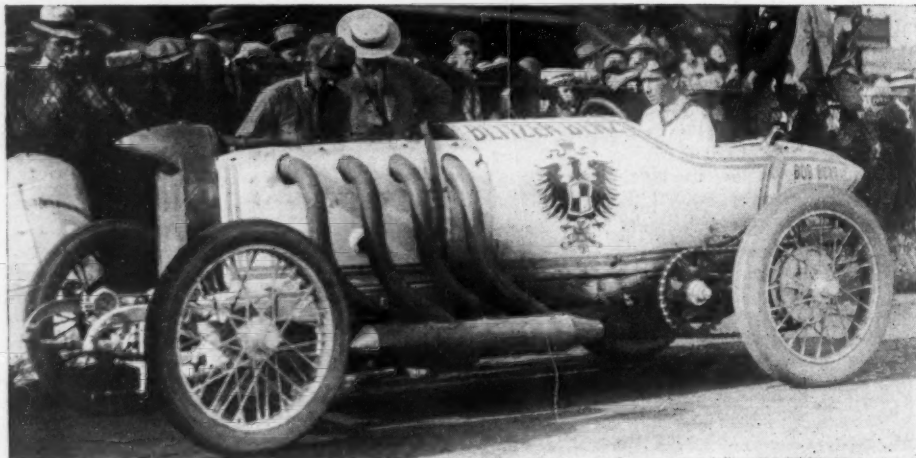


Fig. 1—Blitzen Benz driven by Bob Burman in 1911

WEIGHT OF A VESTA GENERATOR Would Not Be Appreciably Heavier Than Parts Replaced

AUSTIN, Tex.—Editor Motor Age—Which would weigh more, the Vesta electric generating clutch or the parts of the car which it replaced?

2—What is the advantage in using a separate starting and lighting motor generator when a unit like the U. S. L. arrangement can be substituted for the flywheel?

3—How is a connecting rod bearing area figured? I should think it would be somewhat less than the area of a section through the center of the shaft parallel to its axis, due to the fact that the sides of the connecting rod bearing can spring out slightly under tremendous pressures.

4—In the description of the Wisconsin racing motor in Motor Age, issue April 13, it was not stated whether or not the crankshaft is balanced. Is it?

5—In this motor a train of gears is used to transmit power from the crankshaft to the camshaft. A silent chain would have been lighter. Why was it not used?

6—Publish a picture of the Blitzen Benz driven by Burman in April, 1911.—Ralph B. Sisk.

1—It would depend entirely on the type of gearset replaced. On an average, however, the weights would be very nearly equal.

2—It is a matter of the preference of the engineer who designs the car.

3—Connecting rod bearings subjected to the same load vary in size, according to the ideas of the designer.

4—The crankshaft is balanced, as it is in all racing motors of modern design.

5—Gear trains seem to be preferred in racing motor construction. Possibly the designers consider them a more positive form of drive than silent chains.

6—The Blitzen Benz is shown in Fig. 1.

VALVE ARRANGEMENT OF MAXWELL Reader Has Several Questions Concerning Racing Cars

Center, Ind.—Editor Motor Age—Kindly give an illustration of the valve arrangement on the Maxwell which Eddie Rickenbacher drove in the last Indianapolis race.

2—What were the dimensions of the valves in Darlo Resta's Peugeot at Indianapolis, also at Chicago?

3—Could a crankshaft such as is used by the Hudson company be used in a racer to any advantage?

4—How is a racer provided for weight on the rear wheels to insure a firm and steady grip?—W. M. Maggart.

1—This is shown in Fig. 2.

2—The diameter of the Peugeot valves is 2 inches.

3—Hudson Super-sixes are showing up very well in track racing.

4—By carefully balancing all parts of the car and distributing the body and passenger weight.

MOST COMMON OILING METHODS Seven Types from Simple Splash to Force Feed Described

Pleasanton, Neb.—Editor Motor Age—Describe fully the most popular methods of engine lubrication.

2—In the hollow crankshaft lubrication, what kind of a pump is used?

3—How much pressure is there and how is an even pressure maintained?

4—Kindly describe and illustrate the working and timing of the two-cycle Elmore engine. Also the two-cycle Jonz engine.

5—Are there any two-cycle cars manufactured now? If not, why not?

6—What are their drawbacks?—C. B. Skillman.

1—There are seven common forms of motor lubrication. The simplest is the full splash system in which dippers on the lower ends of the connecting rods splash oil from pools in the bottom of the crankcase into the cylinders and bearings.

Part of the oil is fed to the crankshaft bearings through bored holes above the dippers; part is splashed onto the walls of the cylinders and lubricates the cylinders, pistons and piston rings; another part is splashed into the hollow pistons where it collects under the piston heads and drops through slots cut in the upper ends of the rods and lubricates the wrist pins. The cam shaft bearings catch the oil in pockets and feed it through holes bored in them to the bearings.

Another system is the splash with circulating pump. The oil is drawn from the reservoir in the sump of the motor or from a separate reservoir sometimes employed by a circulating pump and delivered to a trough extending the full length of the crankcase. From the trough the oil overflows into separate depressions in the trough and the dippers on the connecting rods splash the oil from these depressions. Lubrication is gained in the same way as in the full splash system described above.

In the pump over and splash system the oil is drawn from a reservoir in the sump of the motor by a circulating pump and forced through tubes leading to pockets from whence it feeds by gravity to the main bearings. Part of the oil circulated by the pump is sometimes discharged over the distributing gears for their lubrication. Another part of the oil is forced by the pump into a trough such as is used in the splash with circulating pump system described above and lubrication is brought about in the same way. After having passed through the various bearings the oil is returned to the sump through a strainer, where it enters the circulating pump and travels its route again.

The force feed and splash system is similar. Oil is forced from the sump under pressure through tubes to the main bearings. Another part of the lubricant is forced into a trough under the con-

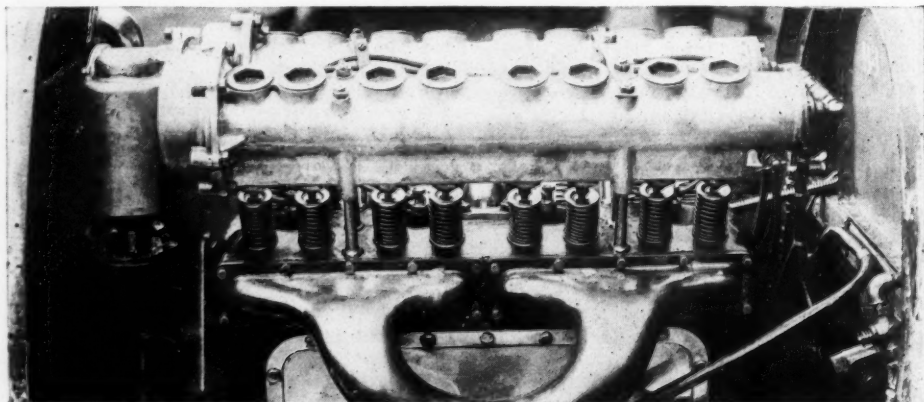


Fig. 2—Valve arrangement of new Maxwell racers

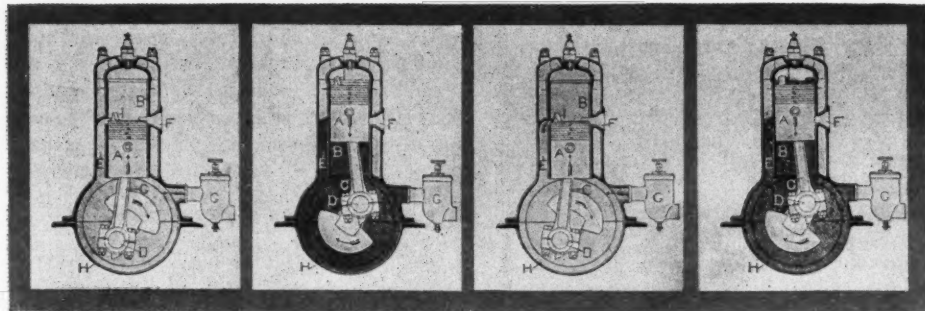


Fig. 3—Operation of common form of two-cycle motor

necting rods and lubrication is carried on as described in the two systems just mentioned.

In the pump over system splash is entirely done away with. Oil is fed from the circulating pump through tubes into pockets from whence it feeds by gravity to the main bearings. Oil from the main bearings is thrown by centrifugal force through ducts bored in the crankshaft to the crankpin bearings. The oil escaping from each side of the crankpin bearings is thrown off in all directions, thus lubricating the cylinders, pistons, and rings. Another part is thrown into the hollow pistons where it collects under the piston heads and drops through slots cut in the upper ends of the connecting rods, thus lubricating the wrist pins.

In the separate force feed system a lubricator, driven by chains or gears, is attached to the side of the crankcase. The oil is forced under pressure through tubes leading from the outside lubricator to the main bearings and the motor is oiled in the same manner as in the pump over system. The oil is fed at its rate of consumption and is not returned to the lubricator.

In what is commonly known as the force feed system oil is forced from a circulating pump under pressure through tubes to the main bearings and part of the oil from the front main bearing feeds into a basin in which the crankshaft gear dips. This gear splashes oil onto the other distributing gears. The surplus oil in this basin overflows and returns to the sump. The oil under pressure escapes from each side of the crankpin bearings and is thrown off in all directions, lubricating the cylinders, pistons, rings and wrist pins. In this system the connecting rods do not dip in the oil.

The full force feed system is the type where every bearing is lubricated under pressure from the circulating pump. Wrist pins are hollowed and oil is forced to them through tubes on the sides of the connecting rods or through the center of the rods. This same tube forces oil to the cylinders, pistons and rings.

2—Generally a gear pump.

3—Pressure varies in different designs. A check valve is generally fitted which opens, allowing the excess oil to flow back to the sump when the pressure exceeds 50

pounds or whatever pressure is desired.

4—Inasmuch as both motors you mention follow common two-cycle practice of construction, we are illustrating in Fig. 3 evolutions in the firing of a typical motor of this kind.

The operations in a two-port, two-cycle engine are as follows: As the motor turns and the piston ascends within cylinder the exhaust and inlet ports are closed and the explosive mixture is drawn into the crankcase through carburetor and check valve. This is the crank case inlet stroke. When the piston descends the explosive mixture is compressed within the crankcase and at the lowest position of the piston in cylinder the inlet passageway is uncovered and the compressed charge imprisoned within the crankcase escapes into the cylinder, filling same. The piston again ascends, closing inlet and exhaust openings and compresses the charge within the cylinder, drawing the new charge at the same time into the crankcase.

At the top of the stroke the charge is ignited and the exploded gases drive the piston forward, permitting expansion, delivery of power and the compression of the new charge within the crankcase.

At the end of the power stroke both the inlet and exhaust openings are uncovered, the burned gases escape through the exhaust port and simultaneously the fresh charge entering the cylinder from crankcase through inlet passageway strikes the deflector and is directed toward the top of the cylinder. This rapid inrush of the new charge aids in scavenging and in driving out the burned gases through the exhaust port. Cylinder compression and crankcase depression again take place as the piston ascends and covers the inlet and exhaust openings. Then, from this point the cycle of operations is continuously repeated.

5—None are being built to our knowledge. They are not as economical as the four-cycle motor in the present stage of development.

WHAT DETERMINES HORSEPOWER? Basis Upon Which N. A. C. C. Formula Rating Is Derived

Chicago—Editor Motor Age—What determines the horsepower of an engine?

2—What determines the size of valves and size of the carburetor?

3—Is there any advantage in a long-stroke motor as compared with a short-stroke one?

4—I wish to build a four-cylinder, four-

cycle, high-speed, air-cooled motor. Kindly advise what information I need for such work.—William Steffen, Jr.

1—According to the N. A. C. C. rating the indicated horsepower of a single-cylinder, four-cycle engine is equal to one quarter times the mean effective pressure acting throughout the working stroke, times the area of the piston in square inches, times the piston speed divided by 33,000. A formula is derived upon the supposition that the average motor will deliver this rated horsepower at 1,000 feet per minute, that the mean effective pressure in such engine cylinders will average 90 pounds per square inch, and that the mechanical efficiency will average 75 per cent. Substituting these values in a brake horsepower equation derived from the indicated horsepower a formula results in which the brake horsepower equals the diameter of the cylinder squared times the number of cylinders, divided by 2.5.

2—Valve size depends on the designer. Valves are made with a view of being large enough to permit filling the cylinder to the greatest possible extent with gas for the explosion and exhausting or scavenging the cylinder as clean as possible. Therefore, the larger the valves, the more power developed by the motor. Carburetor size is determined by the instrument which will feed the cylinders efficiently with greatest economy in gasoline. Carburetor manufacturers will gladly advise you concerning the proper size if you will submit your motor dimensions to them.

3—The long stroke motor is more economical and more powerful for a given bore.

4—The American Technical Society, 58th and Drexel, Chicago, Ill., can furnish you literature and data of use in constructing a gasoline motor of the type you describe. It is suggested that you communicate with them.

ADJUSTING RAYFIELD CARBURETER Explanation of Operations Accompanied by Diagram

Sacred Heart, Minn.—Editor Motor Age—Kindly advise how to set a Rayfield carbureter.

2—What is the cause of a motor missing on high speed?

3—While the engine is cold there is a clicking noise somewhere, but after it is heated up a little the noise almost disappears. I just put in a new wristpin, set the valves and adjusted

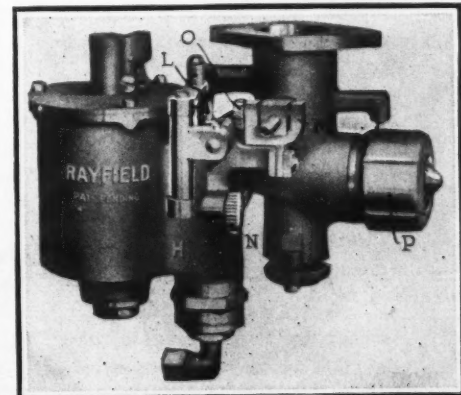


Fig. 4—Diagram to explain Rayfield carbureter adjustment

the bearings. What is the cause of this and how may I remedy it?—Albert Jenkins.

1—The working parts are shown in Fig. 4 and the method of adjusting this carburetor is as follows: To determine the position of the needle valve L in relation to that of the throttle, the dash adjustment is placed in the neutral position, which may be determined by observing that the cam M is out of contact with the low-speed screw N. This screw is next unscrewed until needle-valve arm begins to leave contact with the cam. It should then be turned to the right, one and one-half turns. The automatic air valve is then adjusted by unscrewing its exterior adjustable seat $\frac{1}{8}$ inch. The motor is then primed and started, with the throttle set about one-fourth open. Upon starting it is throttled as slow as it will run, when the low-speed lever is turned one notch at low speed. If the throttle does not close sufficiently to permit slow speeds, the throttle stop on the reverse side of the carburetor may be unscrewed until it does. The low-speed adjustment being obtained, the motor is run until warm, when it is tested by pressing on the automatic air valve at P very gently with a pencil or like instrument. If the motor speeds up the mixture is too rich and should be thinned by turning the low-speed screw to the left until the motor begins to slow down.

The low-speed adjustment being right, the throttle is opened suddenly to see if the motor speeds up. If it is sluggish or pops back into the carburetor, the high-speed adjusting screw O is turned to the right until the fault is remedied. If after having unscrewed this adjustment all the way up the motor continued to pop back into the carburetor, the nozzle is too small. If at intermediate speeds the motor backfires, the adjustable air valve seat should be turned to right, decreasing the quantity of air at a given speed.

2—Spark plug gaps too close together. Carburetor adjustment too lean. Valves not opening far enough.

3—Very possibly it is a piston slap, due to one or more of the pistons having become worn from long usage. It is impossible to diagnose a knock from the meagre description you give.

Expanding Clutch Slips

Zeeland, Mich.—Editor Motor Age—I have a 1913 Elmore roadster, the clutch an expanding type which has been giving me some trouble. What adjustment is necessary to make the clutch hold? Is it supposed to run in oil, and, if so, what grade should be used?

2—Where could replacement parts be secured?—L. S. Markley.

1—The clutch surfaces have undoubtedly become worn through long usage and need relining.

2—The Puritan Machine Co., Detroit, Mich. We would suggest that you present your clutch troubles to this company.

Recharging Ford Magnets

Cleveland, Tenn.—Editor Motor Age—I noticed that in telling a reader how to recharge the magnets on a Ford magneto Motor Age said to "hold a compass over the transmission cover and turn the motor over slowly until

Inquiries Received and Communications Answered

Ralph B. Sisk.....Austin, Tex.
W. M. Maggart.....Center, Ind.
C. B. Skill.....Pleasanton, Neb.
William Steffen, Jr.....Chicago, Ill.
Albert Jenkins.....Sacred Heart, Minn.
A. J. Routhier.....Cleveland, Tenn.
L. S. Markley.....Zeeland, Mich.
Reader.....Kempton, Pa.
Subscriber.....New York, N. Y.

No communications not signed by the inquirer's full name and address will be answered in this department.

the hand of the compass N will point to a spot about $\frac{1}{4}$ inch from the side of fiber contact block on transmission case," but it was not stated whether or not one side is as good as the other. Kindly make this point clear.

2—If the above is correct and is applied to fiber contact block, or near the contact block on the right side, then would it also apply if used in the same manner on the left side?—A. J. Routhier.

1—The test will work equally well with either side.

2—Yes.

METHODS OF LUBRICANT TESTING Meanings of Gravity, Flash, Fire and Cold Test Explained

New York—Editor Motor Age—Explain the meaning of gravity, flash point, fire point and cold tests in testing the values of various grades of lubricating oils.—Subscriber.

The Baumé Hydrometer is in general use throughout the United States.

This instrument, carrying an arbitrary scale, when allowed to float freely in an oil or other liquid, sinks to a depth corresponding to the density of the liquid. The Baumé "Gravity" value is then read at the point where the surface of the liquid intersects the scale. The liquid is maintained at a constant temperature of 60 degrees Fahrenheit.

Specific Gravity is the ratio of the weight of a solid or liquid substance to that of an equal volume of water.

Gravity is of secondary importance in judging the qualities of lubricating oils.

The Flash point of an oil is the lowest temperature at which the vapors arising therefrom ignite, without setting fire to the oil itself, when a small test flame is

quickly approached near its surface in a test cup and quickly removed. When an oil is used for the lubrication of internal combustion engines and thus exposed to severe heat, it becomes imperative not to allow the Flash point to drop much below 400 degrees Fahrenheit. This is a guarantee of efficiency and durability. Flash is indicative of an oil's suitability for such use.

The Fire point of an oil is the lowest temperature at which the oil itself ignites from its vapors when a small test flame is quickly approached near its surface and quickly removed.

Since the Fire is always above the Flash, the Fire value becomes of minor importance when judging fresh oils for use in explosion motors.

The Chill or Cold Test of an oil is the lowest temperature at which the oil will pour. This characteristic need only be taken into consideration because of its effect upon the free circulation of oil through exterior feed pipes, etc., where pressure is not applied. The Cold Test is in no way indicative of the lubricating or heat-resisting qualities of an oil.

Color values of oils are determined by comparing their colors, by transmitted light, with the colors of standardized chromate solutions, or with the colors of glass slides corresponding to these solutions. Color values are given for oil containers of different lengths, fitted with clear glass ends, depending upon the light or dark character of the oil. Thus "100-6 inch" means that the oil sample has a value of 100 when viewed through a six inch container or cell.

Color in no way indicates the quality, or the durability of an oil, neither does it show its suitability for any certain use.

Power Curve of Willys-Knight

Kempton, Pa.—Editor Motor Age—Kindly publish the power curve of the Willys-Knight four-cylinder car selling at \$1,125, from 200 revolutions per minute up to the maximum.—Reader.

1—The power curve is illustrated in Fig. 5.

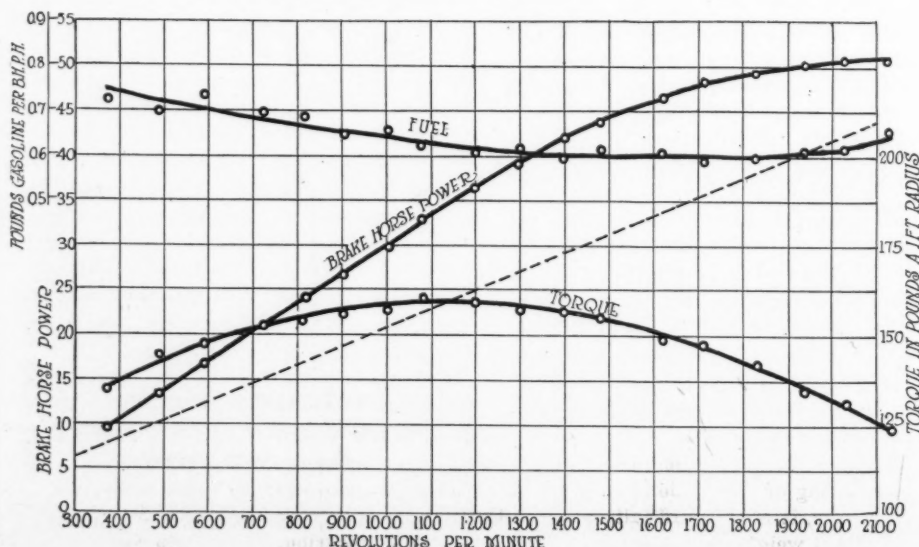


Fig. 5—Power curve of Willys-Knight



The Motor Car Repair Shop



Running the Engine Without the Battery Connected

EVERY few days we receive an inquiry or two attacking our position on the matter of running engines having electric generators in connection when the storage battery is disconnected or removed from the car. We have repeatedly explained that doing this is apt to burn out the windings, but a great many will not believe it. One man even went so far as to say that his garageman told him it would not hurt the generator in the least to run without the battery, and further that when the battery was off the car he even started the engine straight off the generator, requiring no battery at all.

This merely goes to show how very little a great many owners really know about the electrical system, for common sense ought to tell that it would have been absolutely impossible to do any such thing. It is just like saying that he ran a steam engine without a boiler or other source of steam supply. To start the engine, you must draw the current from the battery in order to send it to the starting motor. If there is no battery, you have no starting current.

So much for that. As regards running without the battery, let us say plainly once more—do not do it. Most generators, as fitted to modern electric systems, are of the shunt-wound type, and being of that type, a high voltage is built up when there is no provision for using or taking off the current that is produced. Suppose you were to take a water pump and stop the outlet so that no water could be let out. Now if you pumped water from the well by working the handle, you would be drawing it into the pump, and pretty soon something would have to break if there were no way for this water to get out.

So with the generator. The battery is there to receive the current generated and when it is not in connection, you are stopping the electrical outlet without stopping the inlet, if the engine is running. There are several ways you can overcome this, if absolutely necessary to operate the car when there is no battery. One is to lift the brushes free of the commutator, and another to disconnect the generator drive so that the unit is not running when the engine is operated. Either is a troublesome and inadvisable thing to do unless absolutely necessary.

Lighter Pistons

It is not good practice to bore pistons inside to reduce their weight. In the first place, they were not designed for such lightening of the section of the metal, and, secondly, it is very difficult to assure them of equal weight.

Aluminum pistons are proving very satis-

factory when fitted to old cars where it is desired to give the motor more life. Ordinarily aluminum pistons have to have about double the clearance between themselves and the cylinder walls that iron pistons require, to allow for the difference in expansion between aluminum and iron when these metals become heated. Sometimes this is overlooked and sticking results. Get aluminum pistons from a reputable maker, who has had experience with aluminum and knows its peculiarities; have them of exactly the same weight and see to it that the clearance is correct, when you will make your engine livelier and very likely quieter when it gets warmed up. It is a good idea to fit some form of non-leak rings to these new pistons, thus getting the advantage of compression-tight cylinders along with lighter reciprocating parts. It makes a great difference, especially in old engines that are all right so far as the cylinder walls are concerned.

It is a good plan to overhaul the entire motor if you do take it down to put in such new parts. Having to remove the cylinders, or the cylinder head and the lower part of the crankcase if the engine is of the detachable-head variety, you might as well make a good job of it and go over the whole thing. Tighten the bearings properly, clean out the carbon, see that the water system and the oil system are in good shape and remove any old oil or gummy deposit. Then with your new pistons and rings you will be surprised how wonderfully well the old engine pulls.

Get a New Carbureter.

Owners often write us the trouble they are having with their cars built some three or more years back, due to irregular running, lack of power and similar causes, yet they have completely overhauled the whole thing and know that it is in good shape. They have checked the ignition and know the timing is right; they have assured themselves that the gasoline system is working as it should, and in fact, everything is in tip-top shape, yet they simply cannot make the car run as it should.

Usually the complaint is that the engine persists in intermittently missing. If the carbureter is set to run properly at low speed, then there is trouble when the car is operated at high speed; if the high-speed adjustment is correct, the engine will not throttle down as it should. It seems impossible to find a setting that will take care of all speeds of running, and in order to operate with any degree of satisfaction at all, the carbureter has to be set for too rich a mixture, resulting in sooted plugs, carbonization, etc. Does your case come under this class?

If it does, you might as well make up your mind to change carbureters. Many of the instruments of several years ago were not designed to take care of the present-day low grades of fuel, and it is next to impossible to make them handle it properly. You need not necessarily change makes of carbureters, but change to a later model of the same make if you want to. As in every other branch of motor car construction, the carbureter makers have taken some big strides toward greater efficiency of their product during the past few years, and you cannot expect the instrument that was built for more volatile fuel to take care of the low-grade stuff we now have as well as a carbureter that is of late design for this poorer fuel.

So consult the maker of the carbureter you have, and have a new one put on that is of later design. The difference in performance, once the new one is properly adjusted, will make you disgusted with yourself for worrying along with the old instrument as long as you did.

Another point in connection with gasoline systems is the method of feeding the fuel to the carbureter. Many older cars have pressure feed, and as the pressure pump supplying the air to the tank at the rear gets worn, its effect is lessened and the supply of fuel is not what it should be. Then, too, there are so many chances for air leakage that it is a wonder some of the pressure arrangements deliver any fuel at the carbureter at all. If you discover this to be one source of your irregular running, it might be well to fit a vacuum tank on the front of the dash, this drawing the fuel from the rear tank without any pressure to think about.

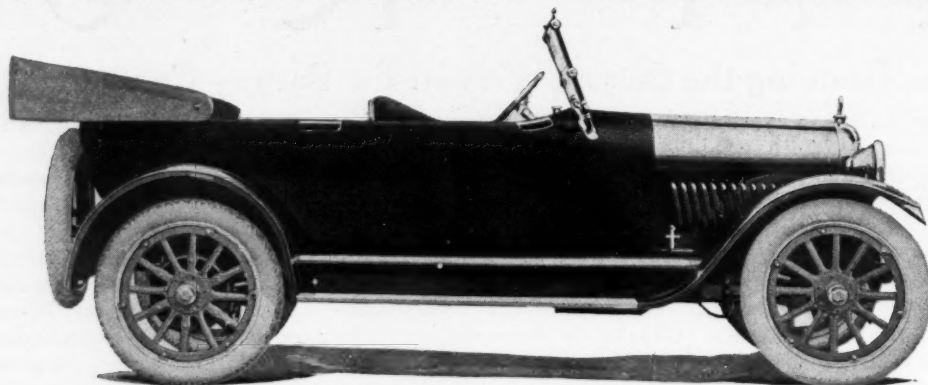
Cleaning Headlight Reflectors

One of the best ways of cleaning the reflectors of headlamps is to procure some jeweler's rouge or fine whiting and apply it to the surface with a soft, moistened cloth. Having cleaned the dirt and other foreign matter off, rub the surface dry with another soft cloth, obtaining as high a polish as you can. Using this material, you will not scratch the reflectors, and their light-reflecting ability will be greatly augmented. The longer dirt and dust are allowed to remain on them the harder it becomes to remove it without damage to the polished surface, hence a little care will pay.

Be sure no moisture or water is allowed to remain within the lamp, for when it is closed, the heat of the bulb is apt to vaporize the few drops of water, which will condense on the reflectors and not only interfere with the light given out, but probably do damage to the reflecting surfaces.

Paige Announces Two Six Chassis in New Series

Price Increased \$40 in Small Car and \$80 in Fairfield Model



Small Paige six with new body lines

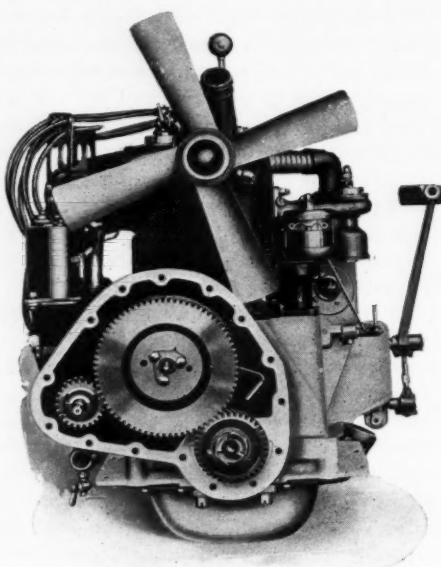
A NEW series has just been announced by the Paige-Detroit company, Detroit, Mich. This is a continuation of the Fairfield model 6-46. In addition the smaller six-cylinder car known as the 6-38 is continued without change. This smaller model was exhibited at the last shows and dates approximately from that time.

The changes in the 6-46 are not radical but incorporate a few body alterations of importance and one mechanical change. The body changes are a sloping windshield instead of the vertical type formerly employed; a new form of upholstery, in which the leather is arranged in piping, giving a long-tufted effect. Better springs are also used in the upholstery and these tend to make the car easier riding. Leather door flaps have been added and in addition there have been some improvements in the equipment in the form of a Moto-Meter, a straight or vertical tire carried in place of the slanting one on the previous car, and a mahogany instrument board. A feature is made of the oversize tire equipment on this car and the color has been changed to Brewster green with ivory white wheels and black bonnet.

Tire Pump Added

The only mechanical change is the addition of a single cylinder tire pump, which is mounted on the gearbox and which is driven from the reverse idler pinion. This pump is a Stewart design and is arranged so that it is easily thrown into mesh by a lever projecting through the floor board and is of sufficient size to pump one of the 35 by 4½ tires in less than 5 minutes.

The Paige 6-46 chassis carries the Fairfield touring body and the Meadowbrook roadster. It is the larger of the two sizes and is mounted on a 124-inch wheel base with a standard tread of 56 inches. The motor is a block-cast 3½ by 4¼-inch unit power plant, having the clutch and gearset integral. The cylinder casting is of gray iron, while the crankcase proper is of aluminum. The lower half of the crankcase,



Front view of 6-38 Paige motor. The large timing gear is made of silk

which incorporates the oil pan, is of pressed steel. The entire valve mechanism is enclosed by aluminum cover plates, and the working parts are submerged in oil. With the aluminum covers and the block casting a very simple exterior appearance is given the motor, while at the same time the plates are removable and give easy access to the valve adjustments.

The gasoline feed system is by gravity. The tank is located beneath the cowl and has a capacity of 14.7 gallons. The carburetor is a Rayfield, supplied with both hot water jacket and hot air intake pipe. The exhaust manifold is located on the opposite side of the cylinder box from the

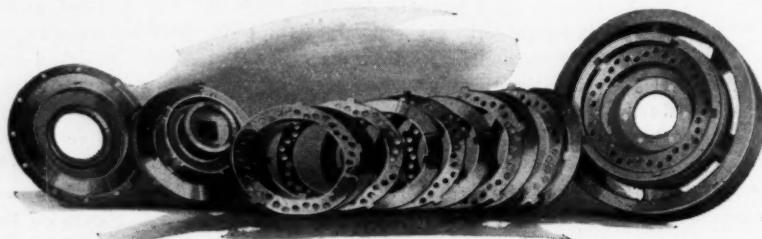
carburetor, and hence in order to get the supply of hot air to the carburetor it is necessary to carry it across the motor. This is done by fitting the hot air stove around the exhaust pipe and then carrying the hot air lead through the cylinder block between the third and fourth cylinders. Connection is made to the carburetor by a flexible tube on the opposite of the motor. The hot air is thus provided directly from the exhaust manifold and is maintained at a high temperature by having it pass through the cylinder block, where it comes in contact with the hot walls of the cylinder and also with the water jacketing.

Electrically, the car is Gray & Davis as far as starting and lighting is concerned, while ignition is taken care of by the Remy high-tension distributor and Williard six-volt storage battery. The starting and lighting system is a two-unit design with a series-wound motor, meshing with the fly-wheel ring gear by means of a Bendix drive; and a shunt wound generator on the right side of the engine, driven directly off the water pump shaft through a flexible coupling. The automatic cutout, which is a magnetic design, is mounted directly on the top of the generator, where it is easily reached.

Ball Bearing Front Axle

The front axle is a one-piece drop forged I-beam, heat treated and provided with ball-bearing spindles. The frame is of high-carbon steel, channel section and it is narrowed in front to permit of a quick turning radius, while at the rear there is a kick-up over the rear axle to reduce the height of the body. The springs are semi-elliptic front with cantilever rear. The front springs are 36 inches long and 2 inches wide. The rear are 48 inches in length and 2½ inches wide. The tires are Goodyear or Firestone, with non-skid tread on the rear. The steering gear is the Jacox irreversible screw and split sleeve type, adjustable for wear in any direction.

In body work, as noted, the cars have been very



Paige clutched disassembled, showing disks and cork inserts

much improved, especially as regards fitting. The touring bodies are particularly roomy and easily carry a seven-passenger load. A change has been made in the prices for this year, the Fleetwood being now \$1,090 for the five-passenger car and the roadster. This is the smaller model known as the 6-38 which, when first announced, was \$1,050. The Fairfield just described sells for \$1,375 in seven-passenger and roadster bodies. This is also a slight increase as the previous model sold for \$1,295.

SAXON TEST SHOWS ECONOMY

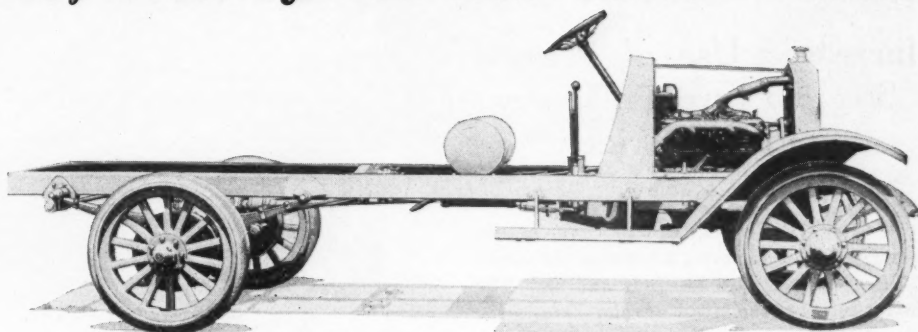
Detroit, Mich., July 10—Results of the Saxon Motor Car Co.'s 300-mile non-stop run, conducted in all parts of the country by the Saxon dealers on July 1, have indicated that the Frye Motor Car Co., St. Louis, Mo., attained the greatest mileage per gallon, and hence this dealer gets the silver cup that was posted as the award for the winner. The Saxon six driven in the test by this concern averaged 34½ miles per gallon.

In the non-stop run, 206 Saxon sixes participated, traveling a total distance of 61,800 miles, and having a grand average of 23.5 miles per gallon of gasoline and 175 miles to the quart of oil. A newspaper man acted as observer in each case, and while the tests were not official, the results obtained are accurate in all cases so far as known. Some of the contestants encountered bad roads and hilly country, while rain interfered in other localities.

REO BUYS NATIONAL COIL

Lansing, Mich., July 10—The Reo Motor Car Co. has bought out the National Coil Co., which employs about 100 men. The building will be used to extend the manufacturing facilities of the Reo company. Although no figures are given out, it was stated by an official of the Reo Motor Car Co. that it has decided to build 50 per cent more Reo passenger cars for the season 1917. This will probably mean a total production of from 38,000 to 40,000 cars. A proportionate schedule has been adopted by the Reo Motor Truck Co.

Day-Elder Junior and Senior Trucks



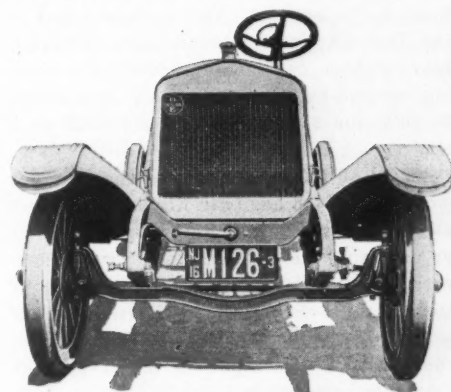
Chassis of Day-Elder Senior truck

EMBODYING practically the same structural features in each, the Day-Elder Motors Co., Newark, N. J., is now producing two models of commercial chassis, rated at 1,250 and 2,000 pounds capacity, known, respectively, as the Junior and Senior trucks. Both are conventional designs, with rather low, rakish lines, Hotchkiss drive through worm gears and unit power plant assembly.

An outstanding feature of the D-E truck is that both models are without governors, the smaller one being mounted on pneumatic tires and especially designed for fast delivery work and the larger with solid tires. Both have small high-speed motors, which should show economy in ordinary work, and yet, being of the high-speed type, they are able to develop higher power than if they were governed. In each model the engine is incorporated with the clutch and gearbox and suspended on three points, final drive being by single shafts with two universals each.

On the Junior model the Le Roi motor is used and on the Senior a Continental. Both are block-cast with valves to the right and both have thermo-syphon cooling through square-tube vertical radiators in sheet-metal cases. Single high-tension ignition with hand spark advance is used on each model, both having Dixie magnets. A Schebler carburetor is used on the Junior model and a Zenith on the Senior.

Clutches and gearsets on both models are the products of the Detroit Gear & Machine Co., and comprise dry-disk



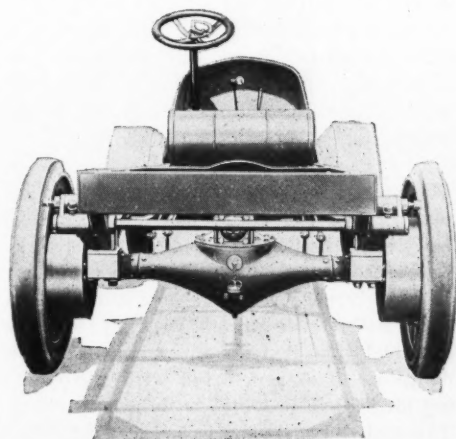
Front view of Day-Elder Senior truck

clutches and three-speed selective gearsets. The shafts and universals are of Hartford make, driving Sheldon worm-driven axles. Both torque and propulsion are taken by the springs.

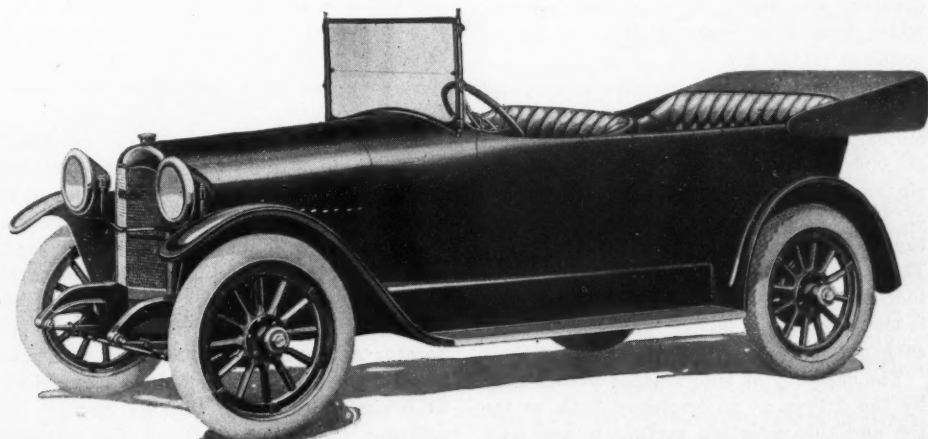
Brakes are all on the rear wheels, consisting of side-by-side internal types, with rocking equalizers. Left steer and central levers are common to both models, Genmer steering gears being used. Jones wheels are employed, the pneumatic-tired ones on the smaller model having demountable rims.

The Stewart vacuum system of gasoline feed is used, fed from a cylindrical tank beneath the seat on each model.

Prices of \$2,000 for the large car at \$1,450 for the small apply to the stripped chassis only, including the driver's cab. Electric starting and lighting will be installed for an additional charge of \$85.



Rear view of Day-Elder, showing pressed steel axle construction



Paige Fairfield six for 1917 season, which sells for \$80 more than previous model

Overland Substitutes Battery for Magneto Ignition

Increased Use of Pressed Steel, to Surplant Heavy Castings, Evident

ANNOUNCEMENTS of the Willys-Overland Co., Toledo, O., now cover a low-price four-cylinder car, known as the series 75-B and the series 85, four and six. The latter series is the latest development in the Overland factory and the cars will not be starting regularly through production until towards the end of July. As mentioned in the June 29 issue of Motor Age, the small four-cylinder car sells for \$635 as a touring car and \$620 as a roadster. The model 85 sells for \$795 as a four and \$925 as a six.

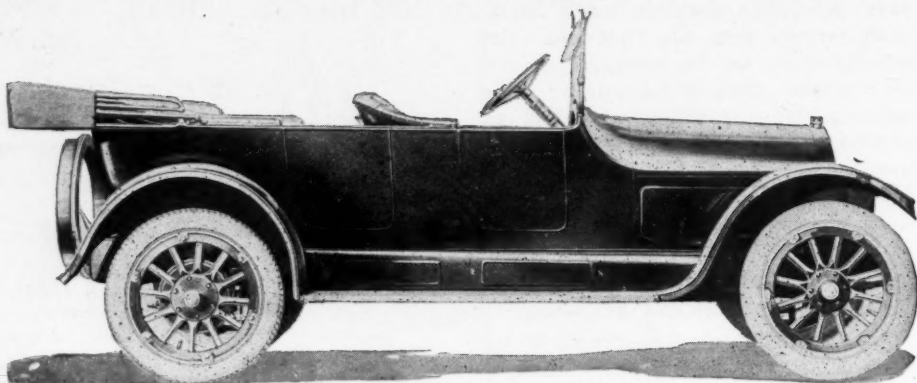
Model 85 takes the place of the previous model 83, which has been discontinued, and although similar in many respects to its predecessor, the new car incorporates several refinements of importance. One of the features is in the increased use of pressed steel to take the place of heavier castings. An example of this is in the rear axle housing. Another important alteration is in the spring suspension which is now cantilever. The gasoline tank has been moved to the rear and a new form of rigid tire support has been incorporated. On the six-cylinder car, spiral bevel gears are used for the rear axle, while on the four-cylinder model the rear axle gears have straight teeth. The use of a leather universal joint is another innovation.

Riding Comfort in Model 85

Probably the most outstanding feature of the model 85 Overland is the particular attention which has been paid to riding comfort. In relation to price both cars are quite long, the wheelbase of the four being 112 inches and of the six 116 inches. Both have large, comfortable bodies, with ample seating room for five persons. In addition to the improvements mentioned above, the seats in these new models have been built lower and deeper with a slight backward tilt to allow the passengers to relax slightly in the seats, and the seat cushions are built on deep coil springs, which bear their share in the easy riding qualities of the car.

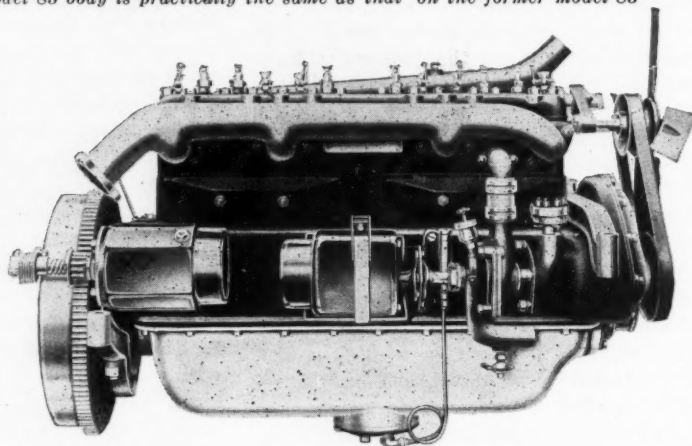
In the four-cylinder car, the powerplant is the development of the four-cylinder motor, which has now been used on over 300,000 Overland cars. It is of block design with a bore of $3\frac{1}{4}$ inches and a stroke of $4\frac{1}{2}$ inches. The manufacturers claim that it will readily develop 40 horsepower. The motor is cooled by thermo-syphon system, and one of the features of the engine is the large water jacket space surrounding each cylinder.

The capacity of the radiator is increased by the fitting of an auxiliary tank at the top and the radiating surface is also augmented by corrugations in the thin vertical



The Overland model 85 body is practically the same as that on the former model 83

Overland model 85 motor, showing distributor used in place of former magneto for ignition



tubes of which it is composed. A shell of pressed steel acts as a protective housing for the radiator tubes and this is made from a single piece of steel having no joints in the metal. The shell is supported in swivel seats, which relieves the radiator from any stresses which would be due to racking of the frame.

Other than in the powerplant, the six-cylinder car is exactly the same as the four, except that the longer motor necessitates a longer hood and consequently a slightly longer wheelbase, the exact difference being 4 inches. All this difference in length is made up at the front end of the car, necessitating, of course, a longer frame on the six than on the four. The six-cylinder motor is also a block design and is characterized by an extremely clean exterior. It has a bore of $3\frac{1}{4}$ inches and a stroke of $3\frac{1}{2}$ inches. It develops from 35 to 40 horsepower, according to the manufacturer's figures.

A departure for the Overland company is in the abandonment of magneto ignition and the use of a battery distributor system in its place. The ignition current comes from the storage battery, which is kept charged by the generator used in the starting and lighting system. A feature of the ignition system is the switch which incorporates a thermo-static throw-off arrangement, by means of which it is impossible to drain the battery through neglect to pull out the switch button. The current passing through the switch causes the tem-

perature to rise in the thermostat, allowing it to bend and close an electric circuit, permitting the current to flow through a coil somewhat like a buzzer. This buzzer arrangement hammers on the switch button until it is thrown out, thus breaking the ignition circuit and preventing the exhaustion of the battery.

One Universal in Overland Drive

There is only one universal in the Overland drive since the gearbox is mounted in a unit with the rear axle. This gear-box provides three forward speeds and is made up of double heat-treated nickel steel gears of stub-tooth type. The gearbox shafts are carried on both roller and annular ball bearings. The rear axle is floated and as stated, on the four has straight teeth, while on the six has spiral bevel teeth. There are four differential gears and the shafts are removable. The differential is carried on adjustable taper roller bearings, while the wheels are on annular ball bearings.

In the body work, the up-to-date conception of stream-line design has been carried out through the entire line. The touring body is built with one-piece cowl and high-backed seat. The doors are hinged in front so that in case they are accidentally left open and strike an object they will be slammed shut instead of broken off. The doors are U-shaped, fitted with disappearing hinges and provided with large pockets. The tool compartment is located under the front seat. The fenders are of heavy sheet steel and are crowned. The finish

is Brewster green with ivory striping. The fittings are nickel and polished aluminum, while the fenders and other trimmings are black enamel.

The price of \$925 for the six-cylinder and \$795 for the four-cylinder touring car includes full equipment with Auto-lite two-unit, six-volt electric lighting and starting system; a complete set of lamps, dimmers and ammeter. There is also a speedometer and an oil pressure gauge, with complete tool equipment and an extra demountable rim. The top is one-man mohair and the curtains are fastened from inside. The windshield is built in and incorporates both the rain vision and ventilating features. On this same chassis there is a touring sedan at \$1,195 in four-cylinder and \$1,325 as a six, and a touring coupe at \$1,045 and \$1,175.

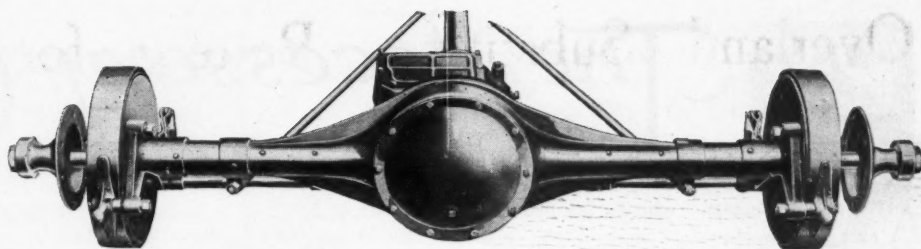
The model 75-B is a new series which has taken the place of the previous small four-cylinder car. It is characterized particularly by a larger motor, with 3½-inch bore and 5-inch stroke, which is claimed to develop 31½ horsepower at 1,950 revolutions per minute, and to have a speed range of from 2½ to 53 miles per hour on high. Another feature of the car is that it is equipped with 4-inch tires. It has cantilever suspension, two-unit, six-volt lighting and starting and complete equipment. The body is now fitted with a one-piece cowl which slopes back in a graceful curve.

The bodies are stream-line, provided with Fabrikoid upholstery, front-hinged U-doors, large pockets and doors and with tool compartment beneath the rear seat, heavy sheet steel crown fenders are fitted, and the finish is black with nickel and polished aluminum trimmings. The equipment is complete, including auto-lite starting and lighting, full set of lamps, ammeter, one-man mohair top, inside fastening curtain, electric horn, combination tail light and license bracket, hinged robe rail, foot rest, tire carrier and extra demountable rim. There is also a full set of tools.

TRUCK COMPANIES MERGE

Detroit, Mich., July 8—Merging of the Signal Motor Truck Co., maker of the Signal line of trucks, and the Commerce Motor Car Co., manufacturer of the Commerce trucks, has been effected here. The new organization taking over these two properties is to be known as the Signal-Commerce Motor Truck Co., and it is incorporated under the laws of New York state with a capital stock of 600,000 shares of no par value. The proposition is to be underwritten by fourteen members of the Detroit Stock Exchange, and active in its management will be Thomas Neal, head of the present Signal concern, and W. E. Parker, who is the head of the Commerce company.

The capital of the Signal company was increased from \$85,000 to \$450,000 in January of this year, and by a stock dividend the Commerce company was also raised



Extensive use of pressed steel is evident in the new Overland rear axle construction

some time ago to \$250,000 capital. It is planned to concentrate the production of a very complete line of trucks, ranging from light delivery types to heavy-duty vehicles, in the new plant of the Signal company, located on Commonwealth avenue, this city, removing the Commerce manufacturing business from its present location on Mackie and Solvay avenues.

These two truck manufacturers are strictly Detroit companies, their stock being largely held here. Each makes a range of models of different capacities, and their merger will eliminate a competition between them that was keen. Mr. Neal, at one time president of General Motors Co., later chairman of the board of directors of that organization, and now one of its vice-presidents, is to direct the policies of the Signal-Commerce concern as chairman of the board. Among the directors will be W. E. Parker, who is also connected with the Mexican Crude Rubber Co.; Myron Neal, of the Aeme White Lead & Color Works; A. H. Buhl, T. J. Bosquette, and W. K. Hoaglund. There are also several other prominent automobile men interested whose names have not been disclosed.

To give some idea of the amount of

money involved, it is understood that the stock will be offered for subscription at about \$6 per share.

TALK CLUB AMALGAMATION

New York, July 10—The first steps toward amalgamation of the two large motor organizations of New York State, representing 115 motor clubs, was taken at a meeting of the directors of the New York State Motor Federation at Rome last Friday. Appointment of a committee of five to confer with a similar committee of the New York Automobile Association concerning consolidation, followed the report of President M. M. Wall, Buffalo, who was in secret conference with President Rowe of the American Automobile Association.

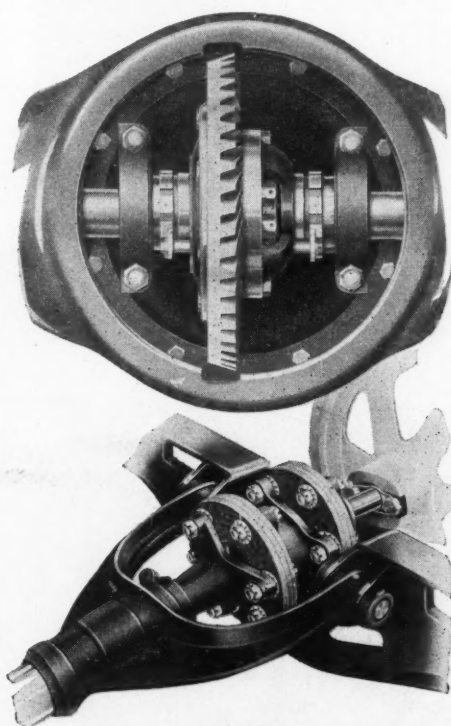
OIL OPERATORS WORKING STEADILY

Tampico, Mexico, July 10—Oil exportations from Tampico and from the ocean-loading racks just outside the harbor of Tuxpam, 120 miles south of here, continue with a regularity that gives no indication that the industry is in any danger from bandits or armed political elements. A sufficient number of Americans still remain here to attend to the shipping requirements of the oil interests. The wells, the pipe lines, the pumping stations and various other property belonging to Americans are in direct charge of trustworthy Mexicans.

In Tampico the large refineries of the Pierce Oil Corp., the Mexican Petroleum Co., and the Standard Oil Co. of New Jersey are running to full capacity. Oil-carrying steamers ply the Panuco River as far up as the Panuco and Topila fields, and traffic upon the inland canal and Lake Tamiahua that connect Tampico and Tuxpam, passing through the heart of the oil-producing country, has not been interrupted.

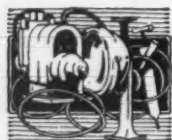
At this time there are approximately 16,000,000 barrels of crude oil in storage at Tampico and the territory immediately adjacent. All of the tank farms are carrying their full capacity of oil. An enormous enlargement of the storage facilities is in prospect as soon as the uncertainty in which the industry is now placed is removed.

That all of the larger producing companies in the Tampico region are convinced that a material improvement in conditions will take place soon is shown by the fact that they are entering into large contracts for the delivery of oil in the United States and other foreign countries.

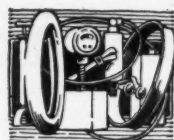


Above—Spiral bevel drive on Overland model 85 six

Below—Double universal of leather disk type, an unusual feature of Overland cars



The Accessory Corner



AN announcement which is proving rather sensational is that of the new puncture-sealing material known as Tireoid and manufactured by the Tireoid Company, 1200 Michigan avenue, Chicago. That the new company is thoroughly well represented is evidenced by the fact that its board of directors includes such men as A. Watson Armour, Armour & Co.; Nelson N. Lampert, vice-president Fort Dearborn National bank, Chicago; H. H. Merrick, Armour & Co., Chicago; H. E. Otte, vice-president National City bank, Chicago; Maj. Robert E. Wood, General Asphalt Co., Philadelphia, and other well-known men. Tireoid is a puncture sealer—not a tire filler—and is a semi-liquid compound, mostly mineral. It is injected through the valve stem, and the moment a puncture occurs the material kept in circulation by the wheel rushes into the wound and seals it against the escape of air, according to the statements of the manufacturers. When the nail, tack or whatever causes the puncture is withdrawn, the compound rushes into the opening and seals it, making the tube as serviceable as before. It contains nothing which is harmful to the rubber and forms a protective coating over the tube, which insures against rim cutting, is the claim. In a test, Tireoid was injected into a tube and 65 nails were hammered through the casing. When these nails were withdrawn the gauge is claimed to have shown no appreciable loss of air. The compound is put up in cans, each containing sufficient material for one tire. Prices for sets of four cans range from \$10 to \$16, according to the size of the tires.

Check on Vacuum Tank

Webb Jay Corp., Karpen Bldg., Chicago, has introduced a vacuum gauge which not only shows whether the Stewart vacuum system is operating or not, but also furnishes a means of measuring the fuel consumption. The gauge is flush mounted on the instrument board and connects with the top of the vacuum tank by a small pipe. It registers the actual suction produced by the motor on the upper chamber of the tank. While this chamber is being filled with fuel, the pressure registered by the gauge is the suction pressure or vacuum of the motor. After this chamber is filled, however, the suction is removed and the pressure brought to atmosphere and consequently, the gauge hand jumps to atmospheric pressure, which is zero. This cycle is repeated over and over. When the upper tank is emptying into the lower, the hand stands at zero and when the upper tank is being filled, the hand registers the suction of the motor. Thus, the hand shows at all times just what is happening in the tank. The capacity of the upper

chamber is 1/40 of a gallon so that it is a simple matter to compute the fuel consumption by watching the hand swing back and forth as each complete movement indicates a consumption of 1/40 of a gallon. It is an extremely simple matter to install this device, it merely being a question of mounting the gauge in the cowl board and attaching the pipe to a threaded connection on the tank, which has been provided just for this purpose.

New Body Enamels

Effecto auto finishes are enamels designed especially for motor car bodies. Pratt & Lambert, Inc., New York, N. Y., Buffalo, and Chicago, are the makers. Only one coat is required and the composition is such that it will dry evenly and smoothly, no matter how carelessly it is applied. It dries quickly so that dust does not have much chance to settle. It is said to be durable, will not crack, chip off nor become dull to weather or through repeated washing. Effecto Auto Top and Seat Dressing is designed to restore mohair and leather automobile tops, seats, side curtains, leather work, etc. It is a rich black. The

dressing dries in about an hour. There is no danger that clothes will stick to the seats, because it does not soften or become sticky, according to the manufacturer.

Dry Cell Guaranteed a Season

The Hywatt dry battery, manufactured by the Cleveland Battery and Electric Co., 1974 East Sixty-sixth street, Cleveland, Ohio, is a square-celled dry battery of entirely new construction and high electrical efficiency. The battery is waterproof and because of its construction cannot lose its efficiency through internal resistance and effects of moisture as is the case in the round dry cell, according to the manufacturers. The cells are connected in series, obviating liability of disconnection through jarring. The batteries are made in 2, 3, 4, 5, 6, 7 and 8-cell sizes, delivering from 1½ to 10½ volts. They are 4½ inches wide and 6½ inches high, the depth varying with the number of cells from 2⅝ inches to 8⅝ inches. It is claimed that all ingredients are totally consumed through the processes of current generation. The 5-cell battery is recommended for motor car service and is guaranteed to last a season. The retail price is 60 cents per cell.

Golden Giant Spark Plug

Although the most striking exterior feature of the Golden Giant spark plug is that the shell is durably plated with 24-karat gold, there are a number of points in the interior which denote the serviceable design and excellent material and workmanship characterizing the construction. A special insulation called blue adamant is used in connection with copper asbestos gaskets made by a special process and a strongly built shell. The bushing is nickel. Electrodes are of pure nickel, insuring delivery of a spark under all conditions. The Bedford Mfg. Co., Mt. Vernon, N. Y., guarantees each plug unconditionally, the guarantee stating that the plug may be returned to the factory at any time if found unsatisfactory and it will be repaired or replaced free of charge. The company co-operates with both dealers and jobbers with all sorts of dealers' helps, such as wall posters, size cards, display cartons, window cards and trims, etc. The plugs are made in all sizes and are packed in individual tin cartons. They sell for \$1 each.

1-Ton Truck for Fords

The Ames Motor Car Co., Owensboro, Ky., has just put on the market a worm-drive attachment for converting a Ford into a 1-ton truck. A heavy channel frame to support the truck body is bolted around and to the rear of the Ford frame. The weight of the truck is carried on half elliptic springs, 3-inch expanding brakes are fitted. The wheelbase is 120 inches,



Dry cell guaranteed for a season



Gauge to check vacuum tank

tires 32 by 3½ and rear wheels are second growth hickory with 2-inch spokes. Tread is 56 inches and the leading space back of the driver's seat, 8½ feet. It weighs 1,100 pounds, which added to the weight of the Ford chassis, brings the unit up to 2,000 pounds. The gear ratio is 6.2 to 1. The price of \$395 is complete with all fittings and the change may be made in a few hours, it is said.

Garage Wheel Caliper

The Bowden wheel caliper consists of a U-shaped member made of tubing which is hinged to the floor by two straps. At one side of the U there is a head which slides vertically and which contains two members which may be moved with inch scales. It is made by Multiform Sales Co., 431 S. Dearborn St., Chicago. Each of these members may be instantly locked in place. First a measurement is taken on the front, using one of the scales and then a measurement at the back using the other, and the difference, after allowance is made for toe in, is the amount the wheels are out of line.

Simple Reboring Machine

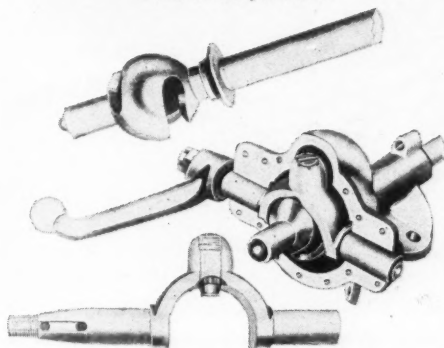
Storm & O'Hare Co., Thompson, Ia., have introduced a reboring machine which is simple yet said to be exceedingly accurate and having a wide range of adaptability, being able to handle reboring jobs in practically any motor car, motorcycle or aeroplane motor manufactured. The cutter head is made in two parts, one part being slotted for four cutters and tapered on one end to allow for lead rings. The head is threaded on the inside to allow for cutter adjustment. The cutters are milled and fitted accurately in the cutter head and are all adjusted at once by the cutter adjustment. They can be locked in any desired position. Two thread bars are furnished, one left-hand thread bar being used for Ford and some other detachable head motors. The right-hand thread bar is used for all other cylinders. Seven lead or expansion rings are furnished with the regular sizes from 3¾ to 4½ inches. The machine is equipped with self-centering devices and is clamped to the cylinder. It is equipped to be operated by hand, but can be altered for machine power.

Master Calorite Spark Plug

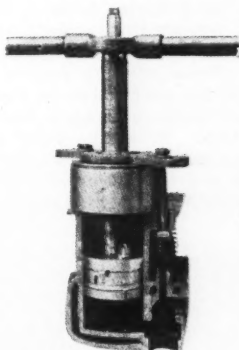
The feature of this spark plug is the special insulator from a material called Calorite which is claimed to have unusual heat resisting properties. The Hartford Machine Screw Co., Hartford, Conn., is the manufacturer. It is said that this plug may be repeatedly heated white hot and then plunged in cold water without any bad effect. Ten tests of this nature failed to injure the Calorite. When the plug was heated red and plunged into cold water, it was necessary to repeat the operation twenty-six times before it failed. It



1-ton truck for Fords



Spiral steering gear for Fords



Simple cylinder reboring tool

is also claimed it will withstand a 10 per cent higher voltage than the finest porcelain obtainable.

Steering Gear for Fords

The Globard spiral gear for Ford cars, manufactured by the Nash Mfg. Co., 1723 O street, Lincoln, Neb., is claimed to be irreversible and requires but one turn of the steering wheel to turn the front wheels of the car from one extreme to the other. The gear works on roller bearings, and it is claimed that it is exceptionally easy to operate and creates a new safety in driving Ford cars. The retail price is \$12.50.

Ryerson Connecting-Rod

This new connecting-rod and bearing enables the owner or repair man to install in a Ford engine a bearing of the same type used in practically all the high-priced cars. The outstanding feature of this product is the fact that it does not require a complete overhauling of the engine but may be installed in a few minutes. When a car has been equipped with these quick

change rods and bearings, new bearings may be slipped in when necessary without tearing down the entire engine. The bearing is the Glyco patented skeleton construction of reinforced babbitt, consisting of a strong skeleton introduced into a high-grade babbitt and finished with great accuracy. Special laminated shims come

with each set of bearings which are inserted one on either side where the halves meet. These are composed of metal leaves 0.002 inches thick and are peeled off at intervals as the bearings gradually wear so that the fit will be as nearly perfect

as possible at all times. Individual boxes each contain one complete connecting-rod and bearing. They are made by Joseph T. Ryerson & Son, Chicago.

New Gasoline Saver

Thomas S. Causey, Dallas, Tex., has invented a gasoline saving device for motor cars which, it is claimed, will burn crude oil successfully. The device will be called a Thermal generator.

With gasoline selling at 20 cents per gallon and crude oil at five cents per gallon, the inventor believes he has an invention which will mean more to the motor car of the world than any other one thing.

The apparatus is designed to control the heat of the exhaust in a manner to get any amount of the heat desired and by it the gas is fed into a generator through a very fine needle valve. The oil comes into contact with the heated surface and is generated into gas, while at the same time the air is admitted in an automatic way that thoroughly mixes with the gas which is taken into the cylinders in the best mixture to produce the result needed. The device has not yet been marketed.

Adams Spark and Throttle Lock

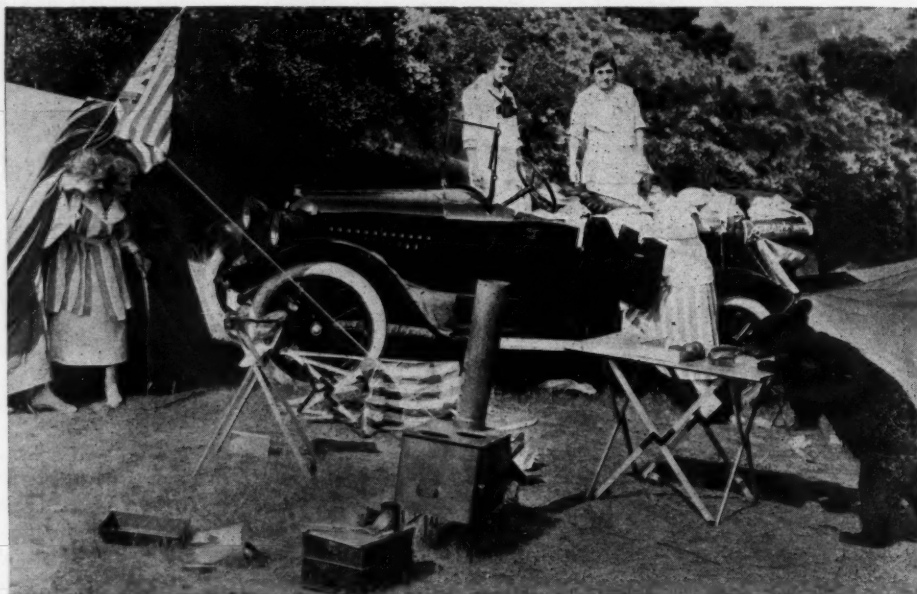
This lock is designed to control both the spark and throttle levers on Ford cars, hooking over one lever and being held to the other by a padlock. The devices are made of sheet steel and nicked, the lock being a four-tumbler type and furnished with two keys. Price 50 cents, A. L. Adams, 18 Normond street, Springfield, Mass., is the manufacturer.

Self-Fluxing Solder

Kester self-fluxing solder, manufactured by the Chicago Solder Co., Chicago, is a seamless tube of solder which is filled with any one of three fluxes—resin, stearine or paste. The solder tubing is guaranteed non-leakable. The tubing is made in wire form and contains many cells, each of which is filled with just the proper amount of flux, which flows with the solder. As each cell is separated from the other no excess of flux can flow out. With the use of this solder there is no need of having separate fluxes or acids. The solder is wound on spools of 1.5, and 10 pounds or cut in sticks 18 inches long.



From the Four Winds



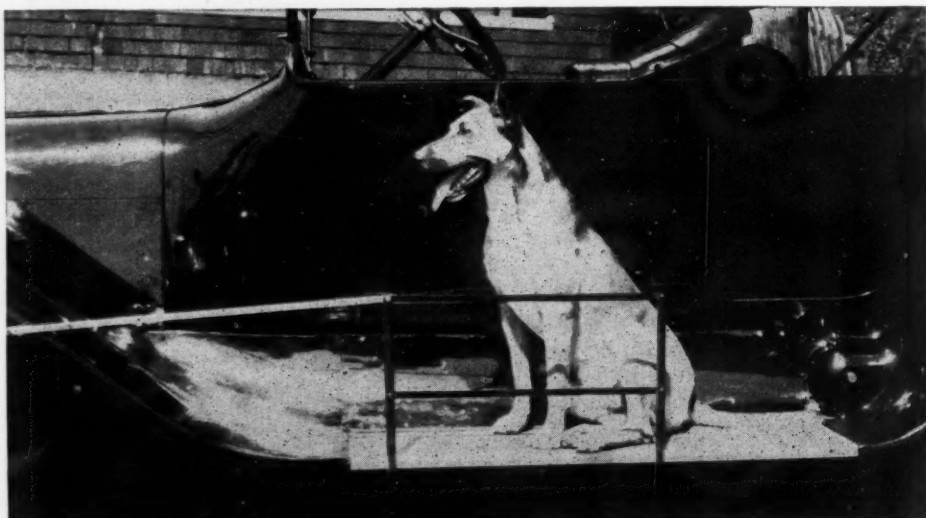
GIRL MOTORISTS CAPTURE A BEAR—Charming woman reversed the usual order of things a few days ago when a number of young women employes of the Frank O. Renstrom Co., San Francisco, Cal., who were enjoying a brief vacation camping trip in a Grant six, captured a bear cub which had been turned loose in their camp as a practical joke by friends of Renstrom. To the young women the incident presented every aspect of the real thing and the joke would have proved serious for the cub and his friends if the situation had not been explained promptly. It was Bruin's crunching of dead leaves and branches as he made his way to the camp of the young women that gave them their first warning of the approach of an intruder and called a sudden halt to their culinary preparations, sending them pell-mell into their tent. From the folds of their abode they breathlessly awaited developments, but they had not long to wait for their visitor soon revealed his shaggy form from behind the trees and the speed with which he was traveling indicated clearly that he was in a hurry. When his owners came for him the girls refused to give him up.

PENNSYLVANIA Tags Prison Made—The prison labor commission of Pennsylvania was the lowest bidder for furnishing license tags to the state highway department for 1917. Other bids were received from those who estimated in former years, but the labor commission was 5 cents per tag lower than the next nearest on all styles.

Pastor Given Motor Car—A practice that may solve the problem of the rural church has been started by the member of the First Methodist Episcopal church, Carthage, Mo. They have bought a Studebaker touring car for their pastor, the Rev. Dr. W. G. Clinton, to help him in making his many routine calls to different parts of the city, and to the country surrounding.

The World Do Move—An odd instance of how fast the world moves, was that in which a boy 16 years old of Claflin, Kan., was involved. The boy had never ridden on a railroad train until last week, when his father took him to Wichita, and he rode home in a motor car which the father purchased, making his first motor trip.

Kansas Car Statistics—Kansas has 89,190 automobiles licensed. A car to every eighteen persons in the state. A year ago, there was one auto to every twenty-two; 2 years ago, one to twenty-six. The largest number of cars are owned in the central part of the state, the great wheat raising section, and Sedgwick county, of which the chief city is Wichita, leads with 4,758; Reno county has 2,981 cars, and Shawnee county, in which Topeka is situated, has 2,650, the third largest number.



GUARD RAIL FOR THE DOG MOTORIST—A novelty in the way of a guard rail for the dog motorist has just been devised and constructed by W. F. Parker of Pasadena, Cal. This is one of the really unique features of the year for the motor car and one which will be welcomed by hundreds of drivers throughout the country. For several weeks after Mr. Parker purchased this new car this faithful pet of the family, which is considered one of the family circle, was permitted to ride within the car, but it soon became apparent that there was an objectionable feature to this practice. It was then decided to transfer the animal's berth to the running board. This was done with the result that each time a corner was turned sharply the canine was thrown to the street, being unable to gain a firm footing on the narrow running board. Finally this trouble was overcome, however, by the constructing of this guard rail. It is made of strips of steel three-fourths of an inch wide and one-fourth of an inch thick. The lower ends of the uprights are bent so that they fit nicely beneath the running board, to which they are riveted. The upper end of the guard is supported by a brace which is fastened in turn to the front fender.

Good Roads Activities

Round Road Corners in Missouri—The county court of Jackson county, Mo., in which Kansas City, Mo., is located, has announced that farmers must donate the land to make road corners round, before roads will be built.

Western Highway Link—The construction of a highway to connect Carrizozo and San Antonio, N. M., will be carried out under the direction of State Engineer James A. French. The new road will connect the eastern tier of counties of New Mexico with the El Camino Real and the Ocean-to-Ocean highway.

Road to Roosevelt Dam—The United States Forest Service plans to construct a highway through the Fort Apache Indian Reservation, in Arizona, to connect Roosevelt and Globe with the Old Trails Highway. The route of the proposed road is through Pleasant Valley, Pine Top and Snowflake to Hollowbrook. It will be the means of opening a new region to automobile tourists.

Saloon License Fees for Roads—Better roads is one of the principal arguments being advanced by the advocates of an initiated constitutional amendment which, if it is approved at the polls next November, will make dry Arizona wet. The amendment provides for local option. Each saloon, under its provisions, must pay an annual license of not less than \$500, the fee to go into the county road fund.

Permanent Good Roads Association—In order to perpetuate good roads day in Pennsylvania, and to make it an annual event, public spirited men and officials of the state government got together at Harrisburg on June 26 and formed the State-Wide Good Roads Day Association. R. L. Munce, Canonsburg, was elected president; A. A. Purman, Waynesburg, secretary; W. H. Davis, West Chester, treasurer.

Progress Made on Texas Road—E. J. Hernan, assistant director general of the National Highway association, has completed a several weeks' field campaign in Texas. He says that rapid progress is being made in the construction of the various links in the Texarkana-to-Laredo highway and he predicts that this road will be an accomplished fact within the next twelve months. In Lamar county a bond issue of \$1,000,000 is soon to be voted on and the good roads movement in other counties along the route of the trunk highway is receiving much attention.

Nebraska Road Campaign—The matter of good roads, in which it is frankly acknowledged Nebraska has been sadly deficient in the past, is to be given strict attention by the good roads committee of the Omaha Commercial Club, Omaha, Neb., during the coming summer in a campaign which is expected to produce far-reaching results. A sub-committee has already been appointed to agitate the matter throughout the state, and the subject was brought fully before the convention of commercial clubs of the state, which met in Omaha recently and thoroughly indorsed the work.

Inspecting Lincoln Highway—H. C. Osterman, field secretary of the National Lincoln Highway Commission, is engaged in making a trip of inspection over the entire route from New York to San Francisco. He is compiling data in relation to the bridges, the width of roads, their condition, and the nature and extent of the improvements that are being made, are under contract, or are under discussion, together with all other detail matter pertaining to the general improvement of this route. It is computed that the sum of \$5,000,000 will be expended upon this highway during the present year. Lee county, Illinois, was offered 3,000 barrels of

Coming Motor Events

TRACTOR DEMONSTRATIONS

July 17-21—Dallas Tex.
July 24-28—Hutchinson, Kan.
July 31-Aug. 4—St. Louis, Mo.
Aug. 7-11—Fremont, Neb.
Aug. 14-18—Cedar Rapids, Ia.
Aug. 21-25—Bloomington, Ill.
Aug. 28-Sept. 1—Indianapolis, Ind.
Sept. 4-8—Madison, Wis.

SHOWS

January 6-13—New York show.
January 27-February 3—Chicago show.

cement free by the commission, to be used in constructing a proposed concrete strip of road near Nachusa.

Kentucky Road Funds—Under the terms of the good roads bill, finally agreed to last week by the house, Kentucky will receive \$1,509,000 from the federal government for the improvement of its highways during the next 5 years, provided the state puts up a like amount. The bill provides that the following sums shall be paid to Kentucky for highway improvement during the next 5 years, beginning July 1, 1916: First year, \$100,600; second year, \$201,200; third year, \$301,800; fourth year, \$402,400; fifth year, \$503,000. Assuming that the State will acquiesce in the half-and-half plan for state highway improvement, an aggregate of \$3,018,000 will be expended during the next 5 years for the improvement of Kentucky highways.



HIGH SPEED LIMIT—Something novel in the way of a speed limit sign for motorists has made its appearance in San Fernando, Cal, this being the 100-mile-an-hour sign shown in the above illustration. For miles around the point where this sign is located the driver is cautioned against traveling more than 25 miles an hour, and in many places the limit is held down to as low as 12 miles. But the owners of this private boulevard are inclined to be a little more liberal in the speed line and to demonstrate this fact they have erected this unusual sign. The board itself is about 8 feet in length and 4 feet wide, the letters and figures being black upon a white background. Strange as it may seem, motorists, when traveling along this boulevard do not travel at reckless speed, notwithstanding the fact that they are not held down by stringent speed laws.

With the Motor Clubs

K. C. Club Building—The Kansas City Automobile Club, Kansas City, Mo., is spending \$10,000 on its country club house south of Kansas City; adding a story, providing a dance hall and other facilities, and will make it a country club equal to any in its accommodations. The installation of an electric light plant will give current for lights, and for small power uses.

Club in Membership Campaign—The Columbus Automobile Club, Columbus, O., has now enrolled 1,750 members in Franklin county and the work of adding new names under the charge of Membership Secretary Anderson is going on rapidly. The goal of the membership campaign is 3,500 which is expected to be reached by the end of the year. Much enthusiasm is shown among the members. The touring bureau is being used to a great extent.

Club Marking Nebraska Roads—The sign car of the Omaha Automobile Club, Omaha, Neb., in charge of Allen Shafer, on June 26 began a continuous campaign of 4 weeks, during which all highways within a radius of some 65 miles of the city are expected to be fully marked with the club's new signs, about 3,000 in number. The new club maps, printed on linen finish stock and enclosed in a heavy folder, fully indexed, will soon be ready for distribution.

Special Officer for Club—A special police officer, paid by the Omaha Automobile club, Omaha, Neb., and distinctively uniformed so as to be easily recognizable, is the latest idea of this progressive organization. His duties will be to trace stolen cars, hunt down the thieves, and keep the club fully informed as to road conditions, both in and out of Omaha. Members are urged to file all complaints at once with this officer for personal investigation. It is likely that the appointment will be made from the regular police department.

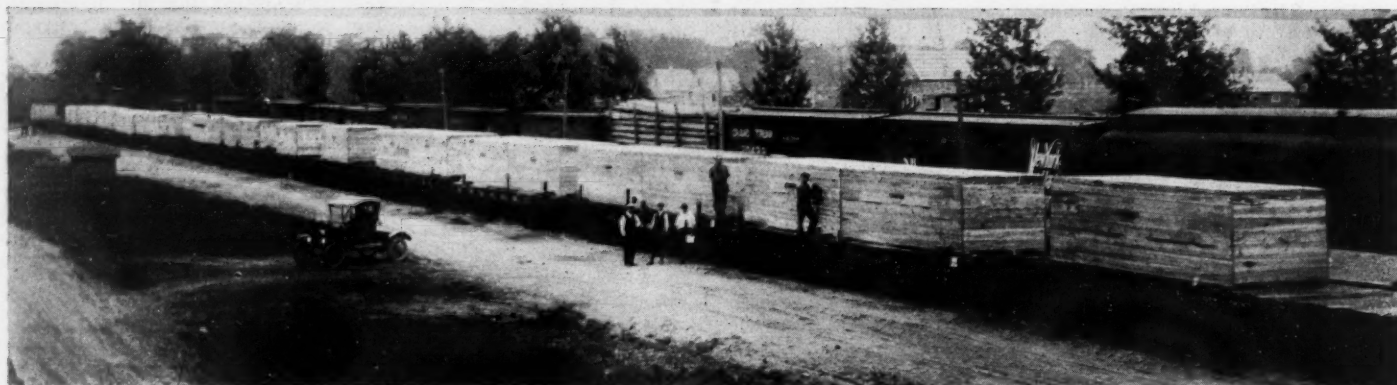
Medina, O., Has Motor Club—The Medina Automobile Club has been organized after three preliminary meetings of leading motorists of Medina county, Ohio. It is the third club to be organized in the county, as the Wadsworth club has about 200 members and the one at Lodi, O., about 100 members. Officers were elected as follows: E. B. Spitzer, president; L. E. Garver, vice president; W. F. Peters, secretary, and Charles Frank, treasurer. An executive committee consisting of the officers and five others has been named.

Club Gets Aid—In order to make the work of the York Motor Club, York, Pa., more effective, the members of the York County Automobile Dealers' Association have combined with the motor club. The three members of the dealers' association, J. W. Richley, J. P. Oden and W. Ilgenfritz, have been added to the board of governors of the motor club. One of the most recent things to be undertaken by the club is the protection of the Grantley road grade crossing on the Pennsylvania railroad just south of this city, where two persons have recently been killed by trains. The safety-first committee of the club met in conference with G. R. Sinnickson, Baltimore, superintendent, and other officials of the railroad here yesterday and were given the assurance that additional signals would be placed at the crossing as well as a watchman.

Club Rids Streets of Nails—Five cents a pound for nails and screws picked up in the streets of North Lonup, Neb., was offered by the Automobile Club, that city. The resultant campaign, carried on largely by schoolboys, netted 285 pounds of rusty metal, which was displayed in a store window. The reward still stands, and the streets are safe for motor traffic.



Among the Makers and Dealers



BIG TRUCK SHIPMENT—There arrived in the freight yards of the Pennsylvania Railroad last week the first of ten trainloads of motor trucks, with the other nine special trains strung out along the railroad from Detroit to New York. It is the largest single shipment of trucks ever made to any one firm in the history of the

trade in this country. The machines, nearly \$2,000,000 worth of them, have been purchased by Gaston, Williams & Wigmore, 140 Broadway, for immediate shipment to Russia, England and France. They were all manufactured by and purchased from the Packard Company at Detroit, and are to be paid for in cash upon arrival.

CHALMERS at Salt Lake—With the intention of erecting a branch and warehouse to take care of that district, the Chalmers organization has incorporated the Chalmers Motor Sales Co., at Salt Lake City, Utah, with a capital of \$200,000. Secretary and Assistant General Manager of the Chalmers Motor Co., is vice-president of the Utah branch and W. P. Kiser is secretary.

Deaco Creditors' Final Dividend—Final dividend to the creditors of the defunct Detroit Electric Appliance Co., Detroit, Mich., maker of the Deaco starting and lighting equipment, has been paid by the Detroit Trust Co., trustee. The final payment checks amount to a little over 3 per cent, bringing the total received by the creditors to about 23 per cent, they having previously received 20 per cent of their claims.

Plan Wisconsin Tire Company—J. H. Newbur, Warsaw, Wis., and other interests, have practically closed a deal for the establishment of a tire and rubber factory at Spooner, Wis., where an enormous supply of hydroelectric current for manufacturing purposes is available at low rates. Spooner capital has decided to take an interest. It is proposed to build a new plant, the first unit of which will be 60 by 150 feet in size.

Overland Expansion—In line with its sales expansion policy, the Willys-Overland Co. has taken steps to facilitate distribution by the opening of new branches at Denver, Col., Jacksonville, Fla., and Omaha, Neb., in addition to increasing its facilities at Columbus, O., Springfield, Mass., and in its home city of Toledo. Buildings have been acquired in the first three named cities, and remodeling and other expansion is being carried on in the latter three. At Toledo,

the Atwood Automobile Co., which was the dealer, has been purchased outright to be hereafter conducted as a factory branch, and A. A. Atwood, and C. T. Atwood, who conducted the local agency, have been taken into the Overland organization, the management of the Toledo branch being now under G. C. Morgan.

Brown Leaves Premier—H. Merle Brown has resigned as stock superintendent of the Premier Motor Corp., Indianapolis, Ind., to accept a position as production manager for a concern in northern Indiana.

Allege Tire Cover Infringement—Alleging a patent infringement in the manufacture of a tire cover, the J. P. Gordon Co., Columbus, O., has brought a suit in the United States court against the Peters & Heron Dash Co., Columbus. The plaintiff asks that the defendant company be enjoined from marketing the tire cover.

Haynes Adding to Plant—The Haynes Automobile Co., Kokomo, Ind., is starting the sixth factory addition built during the last year. The new building, a two-story structure to house the repair department, will bring this year's increase in floor space to a total of 180,000 square feet. The last addition will be ready for occupation September 1.

Loomis Resigns from Packard—Allen Loomis, for the last 10 years with the Packard Motor Car Co., Detroit, Mich., has resigned his position as research engineer to devote his attention to private engineering. An announcement regarding the details of his new work will be made after Mr. Loomis' return from his summer home at Higgins Lake where he will spend July and August, recuperating from a recent operation for

appendicitis. During his long Packard connection thirty-nine patents were granted Mr. Loomis, many of which are embodied in the current Packard cars. A number of other applications for patents are now pending.

Ford Exempt of Louisville Taxes—Exemption from city taxes amounting to about \$2,500 a year has been granted the Ford Motor Co., Louisville, Ky., on its plant there, by the city assessor under the 5-year-exemption ordinance for new factories.

Makes 28,500 Goodyear Tires in 1 Day—The Goodyear Tire and Rubber Co., Akron, O., on June 22 established a new production record of 28,500 tires, the best previous known record being 18,000 tires in a single day. The company has 13,000 employees working in three shifts of 8 hours. To achieve the record run the company for 1 day put on a 12-hour shift so as to utilize 6,700 employees on each shift. A year ago the company was producing about 12,000 tires on the daily average. Last month the gross sales were in excess of \$6,000,000 and the total for the month will exceed \$7,000,000.

Diamond Chain Adding—The Diamond Chain & Mfg. Co., announces that it will begin the erection of a complete manufacturing plant on the 6-acre tract of land which it acquired 4 years ago, on Kentucky avenue, six blocks from the Soldiers and Sailors Monument in Indianapolis. The plans contemplate a concrete structure containing four stories with 150,000 square feet of floor space. The main building will be 380 feet by 60 feet with two ells 100 feet long making the entire frontage 700 feet. The additions will contain the power plant and auxiliary buildings.

Covington, Ky.—B. B. Hume Automobile Company; capital stock, \$15,000; incorporators, A. B. Rouse, John L. Lassing, B. B. Hume, John Keller, F. C. Respess, F. J. Hanlon and J. F. Pieper.

Fond du Lac, Wis.—Frost Tire Co.; capital stock, \$5,000; incorporators, Frank S. Frost, N. F. Frost and F. Baumann.

Ft. Wayne, Ind.—B. F. Royce & Co., to buy and sell motor cars; capital stock, \$15,000; incorporators, Benj. F. Royce, Louis Ankenbrack, Andrew Johan and Frederick Potthoff.

Green Bay, Wis.—Overland-Green Bay Co.; capital stock, \$30,000; incorporators, George W. Browne, Thomas C. McMillan and W. W. Callahan.

Jacksonville, Ill.—Cherry Livery Motor Co.; capital stock, \$3,000; incorporators, John Cherry, Margaret Cherry, John A. Vasconcellos, Percy E. Cherry.

Recent Incorporations

Milwaukee, Wis.—Bachmann-Diener Auto Co.; to deal in new and used cars, etc.; capital stock, \$5,000; incorporators, Walter H. Diener, C. H. Bachmann and T. H. Manning.

Milwaukee, Wis.—Chevrolet Motor Co.; capital stock, \$5,000; incorporators, John B. Sanborn, C. E. Blake and W. J. Aberg.

Milwaukee, Wis.—The Good Roads Association of Wisconsin; non-stock corporation; incorporators, C. C. Jacobus, J. J. Engel and W. H. Reese, all of Milwaukee.

Jersey City, N. J.—Belle Meade Garage, to deal in and handle motor cars and accessories; capital stock, \$100,000; incorporators, George P. Williamson, Benj. Treary, John C. Flanigan, Jersey City, N. J.

Milwaukee, Wis.—The Pan-American Rubber Co., to manufacture cellular pneumatic inner tires; capital stock, \$200,000; incorporators, F. J. Ramler, H. C. Clauson and Norman J. Kopmeyer.

Wilmington, Del.—Motor Car Accessories and Storage Co., to manufacture, sell, store and repair all kinds of motor cars and accessories; capital stock, \$5,000; incorporators, F. B. Hantsell, Philadelphia, Pa.; George H. B. Martin, S. C. Seymour, Camden, N. J.